



COLONY AND PROTECTORATE OF KENYA

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# MEDICAL DEPARTMENT ANNUAL REPORT, 1930

*INCLUDING THE*

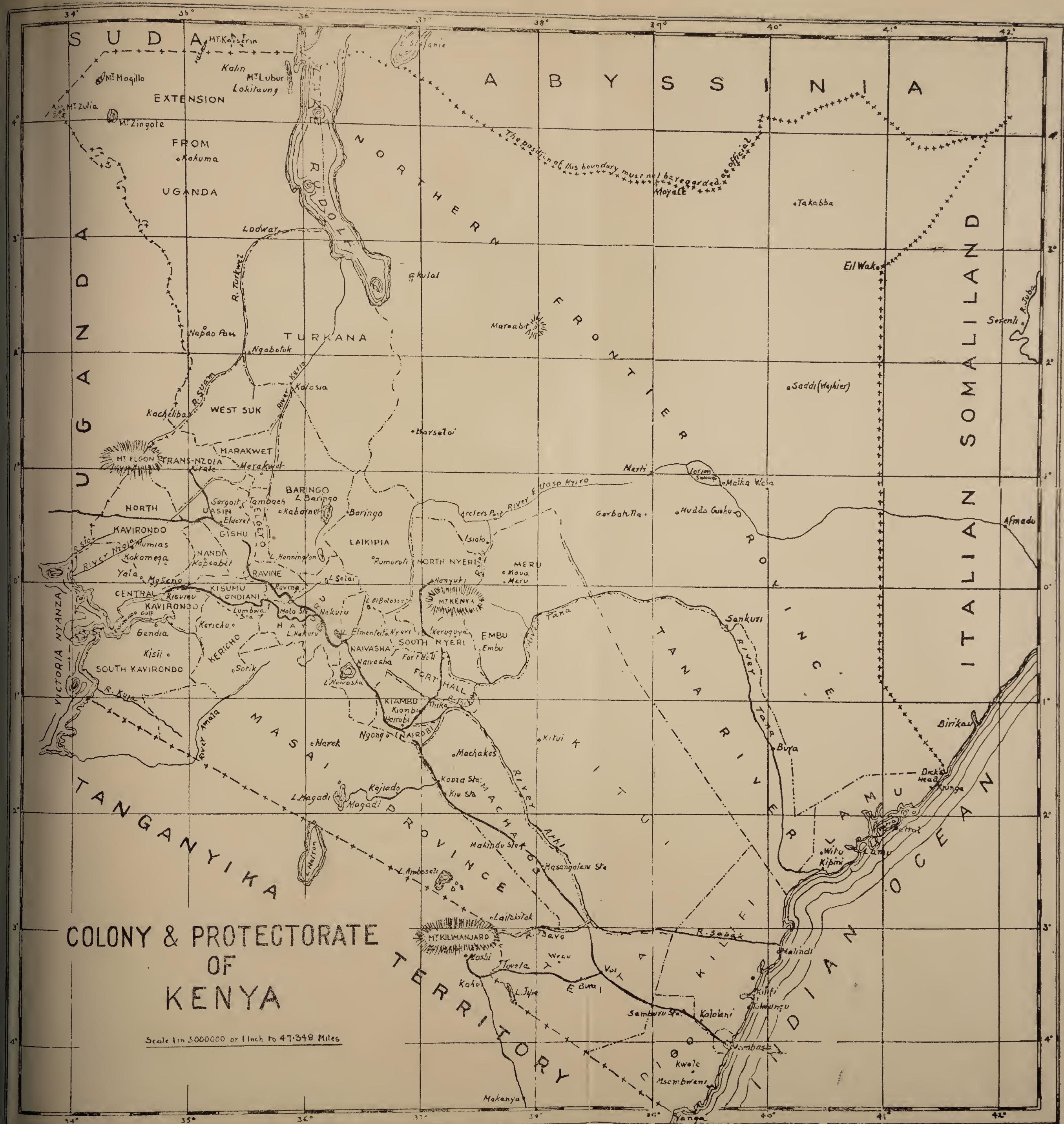
## Medical Research Laboratory Annual Report, 1930

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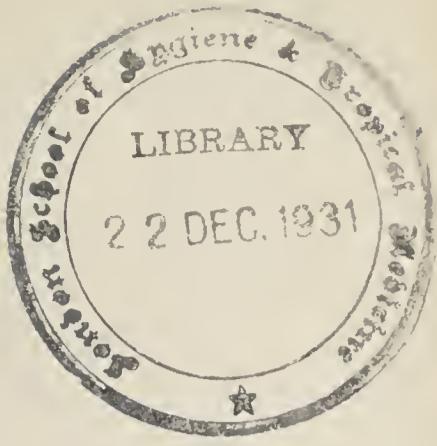
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**MEDICAL DEPARTMENT  
ANNUAL REPORT, 1930**

*INCLUDING THE*

**Medical Research Laboratory  
Annual Report, 1930**



No. 16/719/36.

MEDICAL DEPARTMENT HEAD OFFICES,

NAIROBI.

*6th July, 1931.*

SIR,

I have the honour to submit for the information of His Excellency the Governor, and for transmission to the Right Honourable the Secretary of State, the Medical Report on the Health and Sanitary Conditions of the Colony and Protectorate of Kenya for the year 1930, together with the Returns, etc., appended thereto.

I have the honour to be,

Sir,

Your obedient servant,

JOHN L. GILKS,  
*Director of Medical and Sanitary Services.*

*The Honourable The Colonial Secretary,  
Nairobi.*



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# MEDICAL DEPARTMENT

## ANNUAL REPORT, 1930

### I.—ADMINISTRATION.

The administration of the Medical Department was conducted on the same lines as have obtained previously.

The Municipality of Nairobi and the Mombasa Municipal Board proceeded with the appointment of their own sanitary inspectors, and the Nairobi Municipality obtained its own medical officer of health. At the close of the year only the following officers remained seconded, namely one senior sanitary inspector to Nairobi and one senior health officer and two sanitary inspectors to Mombasa.

(a) The following are the principal appointments, promotions, changes, etc., made during the year :—

- (1) Dr. J. McP. Campbell, transferred to Tanganyika Territory on promotion to Senior Health Officer on 5th November, 1930.
- (2) Dr. N. MacLennan, transferred to Palestine on promotion to Senior Health Officer on 6th June, 1930.
- (3) Miss A. E. Davis, transferred to Zanzibar on promotion as Matron on 19th October, 1930.
- (4) Captain J. S. Robertson, M.B.E., Medical Storekeeper, retired on pension 9th November, 1930.
- (5) Mr. H. Elliott, M.B.E., Medical Storekeeper, appointed 1st August, 1930.

#### New Appointments.

Medical Officers	...	...	...	...	...	3
Entomologist	...	...	...	...	...	1
Nursing Sisters	...	...	...	...	...	8
Medical Storekeeper	...	...	...	...	...	1
Chief Instructor	...	...	...	...	...	1
Laboratory Assistants	...	...	...	...	...	3
Wardmasters	...	...	...	...	...	2
Dispensers	...	...	...	...	...	2
Clerk	...	...	...	...	...	1

#### Resignations.

Medical Officers	...	...	...	...	...	2
District Surgeon	...	...	...	...	...	1
Nursing Sisters	...	...	...	...	...	3
Clerk	...	...	...	...	...	1
Sanitary Overseers	...	...	...	...	...	2
Laboratory Assistants	...	...	...	...	...	2

#### Transfers to Other Colonies and Administrations.

Health Officers	...	...	...	...	...	2
Nursing Sisters	...	...	...	...	...	2
Sanitary Inspectors	...	...	...	...	...	2

#### Retirement.

Medical Storekeeper	...	...	...	...	...	1
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#### Appointments Terminated.

Wardmaster	...	...	...	...	...	1
Dispenser	...	...	...	...	...	1
Sanitary Overseer	...	...	...	...	...	1

(b) The following Ordinances affecting public health were enacted during the year :—

- (1) The Food and Drugs (Adulteration) Ordinance, 1930.
- (2) The Public Health (Division of Lands) (Amendment) Ordinance, 1930.
- (3) The Townships Ordinance, 1930.

#### **FINANCIAL.**

The total of the sanctioned estimates for the Medical Department for the year 1930 was £257,415, an increase of £8,854 over the previous year.

The total for personal emoluments was increased by £4,455 to allow for the appointment of one assistant medical storekeeper, two European clerks, one non-European clerk, one issuer of medical stores, two African clerks, one medical officer, four nursing sisters, one wardmaster, one sub-assistant surgeon, three compounders, two motor car drivers, one entomologist, one laboratory assistant, one malaria overseer and one laboratory assistant (non-European).

The comparative table of the sanctioned estimates and expenditure of the Medical Department for the past three years is as follows :—

YEAR	Sanctioned Estimates	Sanctioned Extraordinary Estimates	Total Sanctioned	Actual Recurrent Expenditure	Actual Extraordinary Expenditure
1928 ..	£ 204,801	£ 5,265	£ 210,066	£ 195,161	£ 4,141
1929 ..	233,506	15,055	248,561	222,184	11,573
1930 ..	250,834	6,581	257,415	236,729	5,037

Only one new vote appeared in the estimates, viz. "Contribution to Government of Uganda in respect of Human Trypanosomiasis Research, £375."

The actual expenditure in the year was £15,649 less than the sanctioned total.

The revenue collected amounted to £30,859, against £34,325 in 1929.

Of the total estimated expenditure in 1930 of £3,483,862 for the Colony and Protectorate, £257,415 represented expenditure on Public Health and Medical Relief, a ratio of 1 to 13.53 or 7.39 per cent.

Detailed returns of the revenue and expenditure are given in Table II at the end of the report.

#### **II.—PUBLIC HEALTH.**

No widespread epidemics occurred during 1930.

There appears to have been an increase of plague, mainly in the Kavirondo and Kikuyu countries, the chief endemic centres. The Port of Mombasa was not affected.

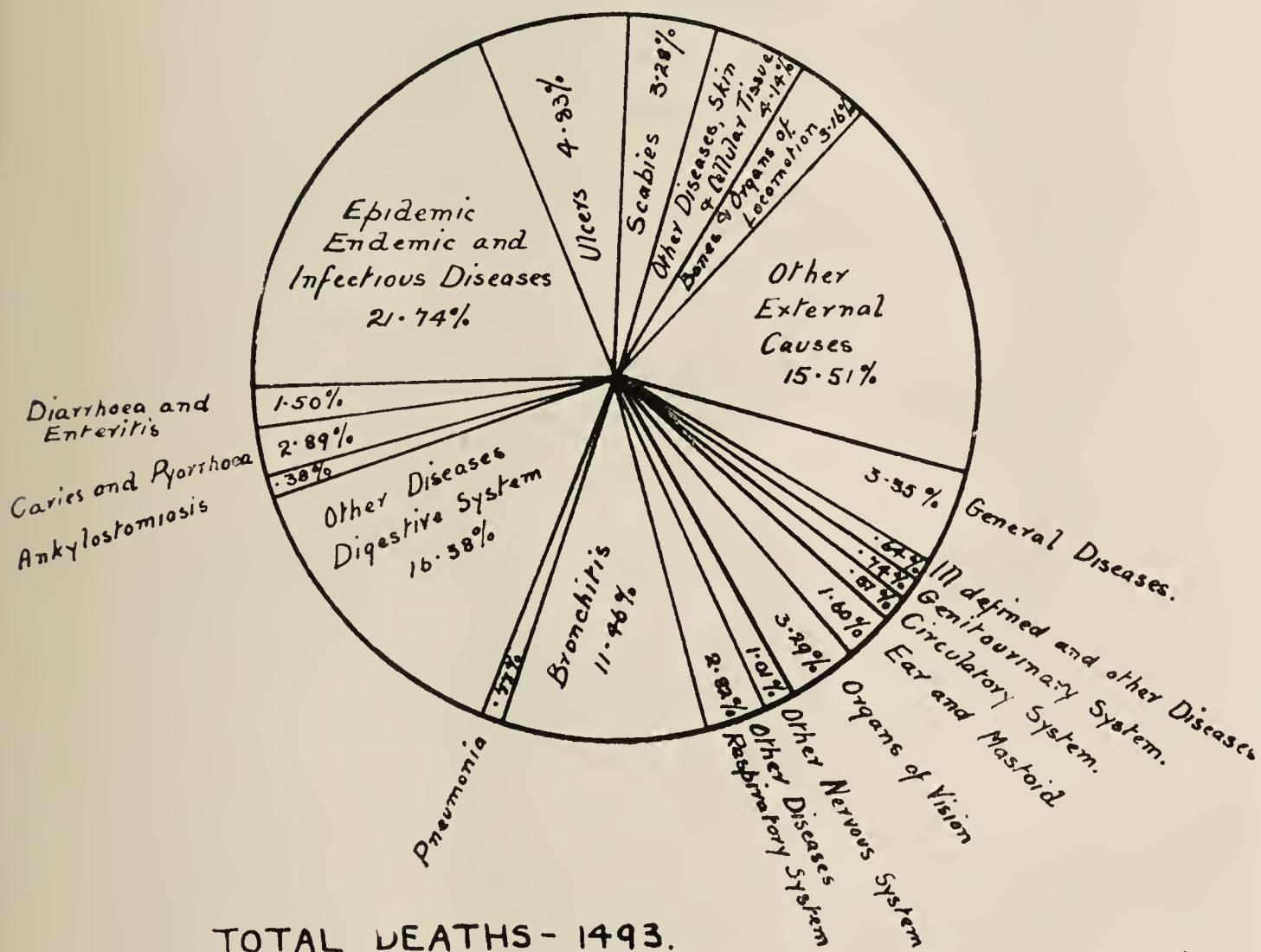
Smallpox made its appearance in Mombasa, apparently having been introduced from India, but only 21 cases in all were detected, of which 20 occurred in Mombasa itself.

There seems to have been an increase in malaria in the Ukamba Province.

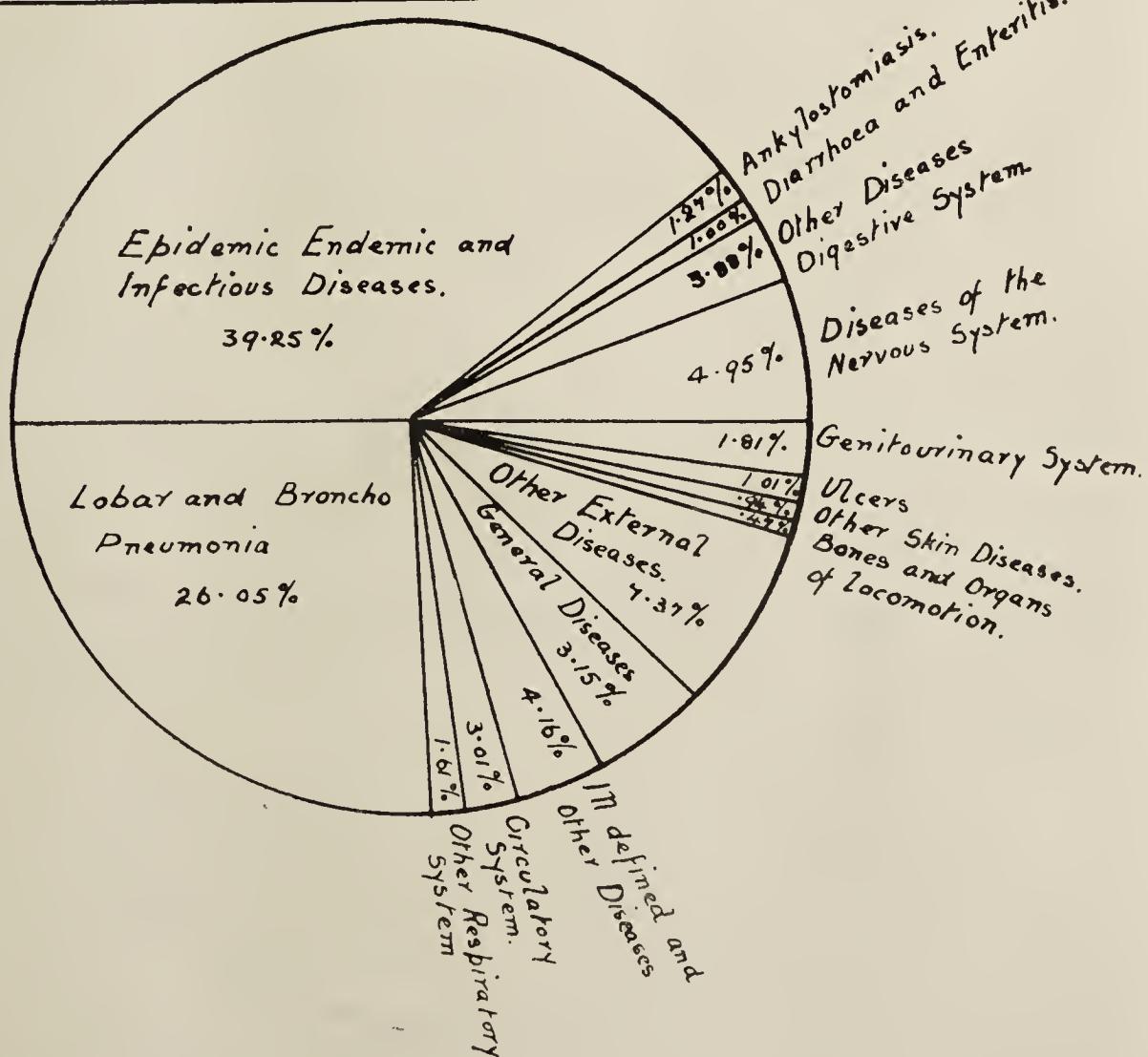
The conditions which regulate the state of the public health remain generally unchanged, although the desire for education, especially as regards better housing and amelioration in the conditions of life, continues to manifest itself. Any definite improvement in the public health of the native section of the population can only accompany improvement in their status as regards education and in economic conditions. Progress in these matters must inevitably be too slow for definite advance to be recorded in any one particular year; there is no doubt, however, that progress is being effected.

The Proportion of Epidemic, Endemic, Infectious, Systemic, and other Diseases shown as percentages of Total Cases treated at Hospitals and Dispensaries

TOTAL INCIDENCE - 260,373.

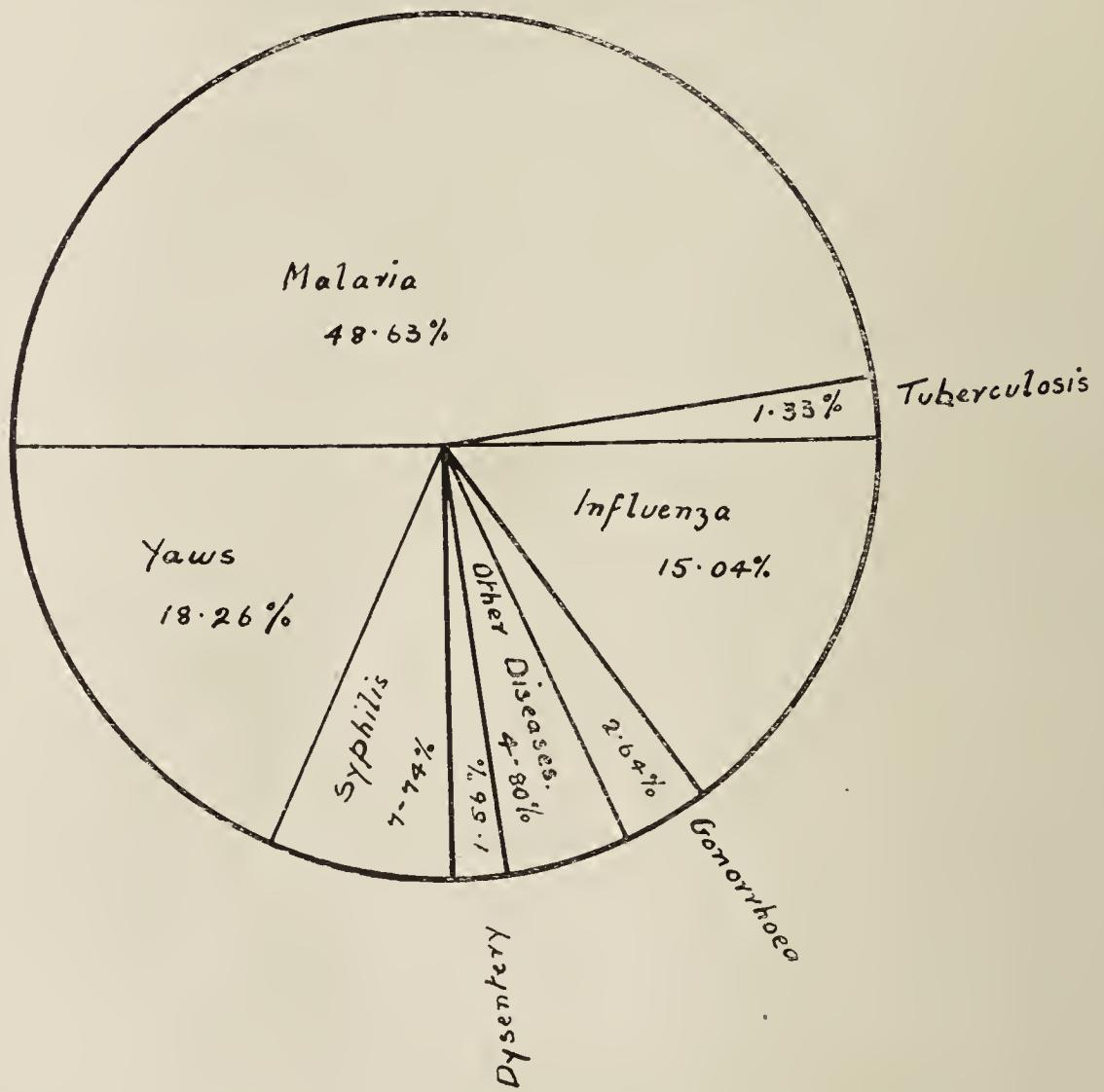


TOTAL DEATHS - 1493.

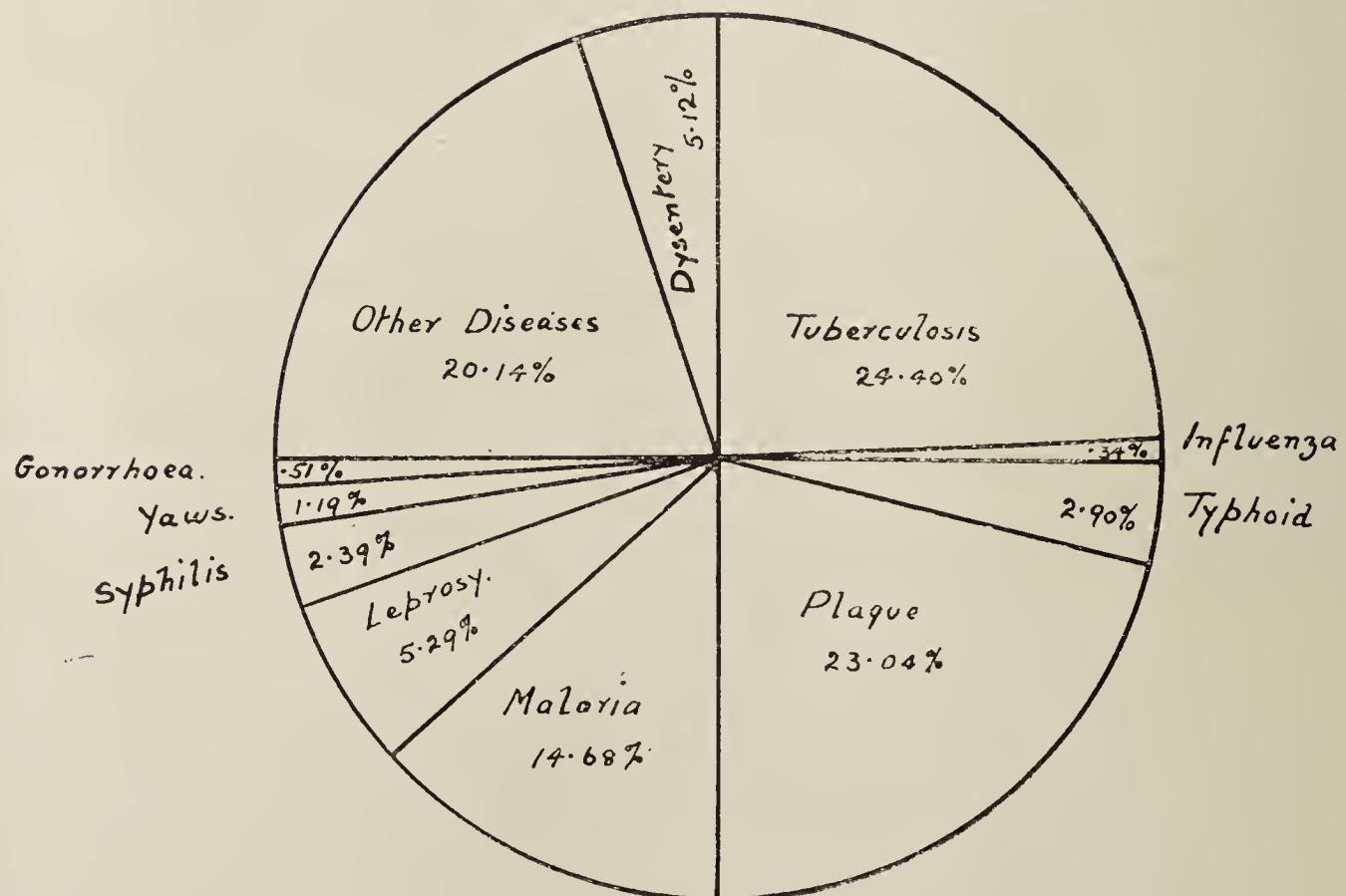


Proportion in Percentages of Epidemic, Endemic, and Infectious Diseases, In and Out Patients, treated at Hospitals and Dispensaries

TOTAL INCIDENCE - 56,618.



TOTAL DEATHS - 586.



## (I) GENERAL DISEASES.

## MALIGNANT DISEASE.

A number of cases of malignant disease among the native population continue to appear in the reports. The total number for the year under review was 82. Specimens from native patients which were subjected to histological diagnosis at the Laboratory were :—

Carcinoma	...	...	...	...	...	30
Chorion-epithelioma	...	...	...	...	...	1
Hypernephroma	...	...	...	...	...	1
Sarcoma	...	...	...	...	...	19

## RHEUMATISM.

Although cases are returned as rheumatism or acute rheumatism in considerable numbers, there is no reason to suggest that the classification is anything more than symptomatic. True acute rheumatism or rheumatic heart affections are, at the most, only very occasionally met with among natives.

## DEFICIENCY DISEASES.

The total of cases returned under the headings of the various deficiency diseases was smaller even than in 1929. The figures were :—

Scurvy	...	...	...	...	...	30
Beriberi	...	...	...	...	...	4
Rickets	...	...	...	...	...	6

In spite of the paucity of the numbers, there is no reason to modify the opinion previously expressed that a high proportion of natives are in a pre-deficiency stage.

## (II) COMMUNICABLE DISEASES.

## (a) MOSQUITO OR INSECT-BORNE.

## Malaria.

There was no recurrence during 1930 of the epidemics of malaria which have been reported in former years. There appears to have been an increase in incidence in the Ukamba Reserve, possibly due to unusually heavy and prolonged rains, with an increase in the number of breeding places in that usually arid district. Reports from Kiambu indicate that the infection may have been more common there than in normal years.

Apart from the foregoing, the general position appears to have been that the incidence of malaria was such as may be regarded as normal; that is to say, a high, in some cases much higher, proportion of the population was affected in the districts at lower altitudes than in what is generally classed as the Highlands, although there is no reason to suggest that the disease is entirely absent even in these latter, except possibly in very circumscribed areas.

During the course of the sleeping sickness census undertaken in the Kavirondo Reserve, certain observations on the incidence of malaria were made. In one location in South Kavirondo, the bloods of 467 individuals (men, women and children) were examined by the stained-thick-blood-drop method; in 451 (96.57 per cent) parasites were discovered. There was no obvious indication that the subjects examined were inconvenienced by their infection. In a location in Central Kavirondo, 203 unselected children under the age of 12 were examined for malaria. The spleen rate was 91.6 per cent, the parasite rate 95.1 per cent, and the gametocyte rate 5.9 per cent.

The total number of cases and the varieties which appeared in the returns were :—

Tertian	...	...	...	...	...	334
Quartan	...	...	...	...	...	663
Aestivo autumnal	...	...	...	...	...	4,423
Undifferentiated	...	...	...	...	...	21,557
Cachexia	...	...	...	...	...	501
Cerebral	...	...	...	...	...	7
						Total ... 27,485

Of 789 cases reported in Nairobi, the Medical Officer of Health considered that the infection was acquired within the Municipality in 107.

**Blackwater.**

The comparative table of cases treated by the Government medical staff for the past five years is as follows :—

	<i>Cases.</i>	<i>Deaths.</i>
1926	...   ...   ...   ...   52	...   ...   16
1927	...   ...   ...   ...   34	...   ...   7
1928	...   ...   ...   ...   35	...   ...   13
1929	...   ...   ...   ...   38	...   ...   11
1930	...   ...   ...   ...   50	...   ...   8

Thirty-nine of the cases and seven deaths occurred among the non-European population.

**Plague.**

Although there was but a comparatively small increase in the numbers of cases of plague in the returns, which totalled 959 for 1930, as against 763 in the previous year, there is little doubt that the disease was generally more prevalent, particularly in the Kavirondo and Kikuyu Provinces, two centres where it must be regarded as endemic. From observations and complaints which were received from individuals in various parts of the country, there seems to have been an associated increase in the number of rats.

From the point of view of trade, it is satisfactory that only three cases of plague—two undoubtedly imported from up-country—were detected in Mombasa.

The disease made its appearance in Nairobi, and the report of the Medical Officer of Health shows that 112 cases came under observation, with 88 deaths. Its presence was largely confined to those areas where housing is unsatisfactory and where conditions favour its appearance.

Notifications at other centres were :—

Nakuru and district	...   ...   ...   ...   ...	43
Kisumu	...   ...   ...   ...   ...	16
Eldoret and Kitale	...   ...   ...   ...   ...	Nil.

**Trypanosomiasis.**

The hospital figures show a total of 40 cases of sleeping sickness, but these have no necessary relationship to the amount of the disease present in the country generally. Apart from geographical considerations, which prevent patients applying for treatment in hospital, facilities have been provided during 1930 in the locations affected. During the whole of the year a medical officer has been employed in making a census of cases and in treating those detected. Both South and Central Kavirondo were explored, and by the end of the year the work was almost completed, only three locations remaining to be dealt with. During the course of the census approximately 75,000 individuals were examined and 341 cases were discovered. It will be remembered that at the previous census in 1927 a total number of 388 cases was discovered.

Although the investigation was not actually completed by the end of the year, sufficient information had been collected to show that there exist three small centres of high incidence of the disease in Central Kavirondo, in Samia, Kadimu and Uyoma respectively, and that a rather larger focus occurs in South Kavirondo on the north bank of the Kuja River.

With regard to the area on the Kuja River, the figures of cases discovered during and since the 1927 census are of interest; they are :—

1927	...   ...   ...   ...   ...	113
1929	...   ...   ...   ...   ...	176
1930	...   ...   ...   ...   ...	153

It will be observed that control by methods of treatment alone, under the conditions which have hitherto governed the amount of attention which can be given, has not been effective in reducing the amount of disease, though it may have limited the amount of infection.

The method of treatment at the beginning of the year consisted in the giving of three injections of Bayer 205, 1 grm. weekly, followed by three injections of 2 grm. of tryparsamide, also at weekly intervals. Later, six weekly injections of tryparsamide were given.

### Relapsing Fever.

The figures for relapsing fever remain at about the same level as of previous years. The totals have been :—

1928	...	...	...	...	...	79
1929	...	...	...	...	...	58
1930	...	...	...	...	...	62

Distribution has been unchanged; as in 1929, the largest numbers are returned from Meru and Voi, which between them account for fifty per cent of the total.

### Typhus.

Although the total (22 only) is small, there was a considerable increase in the number of cases which were reported from Government sources. Four were reported from Mombasa. The latter is interesting, as it is the first occasion on which there has been official information of the presence of the disease in that town.

As in previous years all the cases occurred among Europeans. Hitherto there has been no report of the disease among the non-European population.

### (b) INFECTIOUS DISEASES.

#### Pneumonia.

Hospital returns and reports from medical officers of health all indicate, as in previous years, that pneumonia is the most common cause of death among Africans outside their reserves. The same may be true of the population in their own homes, but information is lacking on this point.

At Nairobi, diseases of the respiratory system were responsible for 300 deaths, equalling 39 per cent of the total deaths recorded, and of the total of 300, 206 are definitely labelled as pneumonia. At Nakuru, 48 per cent of the total deaths were due to pneumonia. At Kisumu, pneumonia and broncho-pneumonia were the causes of 34.9 per cent of all deaths among Africans. At Mombasa, 21.8 per cent of deaths were due to pneumonia. The Medical Officer of Health, Eldoret, observes that "pneumonia and broncho-pneumonia were responsible for more deaths than any other disease."

Although there was a considerable fall in the total of deaths from pneumonia among prisoners, 12 only being reported, these constituted 41.3 per cent of the total deaths recorded.

The comparative table of admissions to Government hospitals and deaths for the past five years is shown below :—

Year	Admissions	Deaths	Death-rate per hundred
1926	1,263	255	20.2
1927	1,301	279	21.4
1928	1,314	362	27.5
1929	2,175	398	18.3
1930	2,014	389	19.2

It will be observed that the figures differ little from those of 1929.

#### Smallpox.

During the year the infection of smallpox was introduced into Mombasa, almost certainly from India, a passenger developing the disease very shortly after landing. Only a small outbreak resulted, the total cases being 21, of which 20 were detected in Mombasa itself; 6 deaths occurred.

No cases other than those referred to above came under observation during the year.

**Syphilis.**

The total cases from the returns show an increase of almost 7,000 over those of the previous year. Comparative figures for the last five years are as follows :—

1926	...	...	...	...	16,218
1927	...	...	...	...	17,054
1928	...	...	...	...	24,442
1929	...	...	...	...	18,496
1930	...	...	...	...	25,205

In previous reports, stress has been laid on the unreliability, and the reasons therefor, of the figures submitted. It is unnecessary to recapitulate what has already been said on that point, and it is sufficient to note that there is no reason to alter the opinion previously expressed. It may be noted, however, that of the total almost 20,000 appear in the returns from dispensaries staffed by native dressers.

In an endeavour to arrive at some idea of the incidence throughout the country both of yaws and syphilis, the hospital returns for the years 1926 to 1929 have been analysed. The following conclusions were arrived at :—

1. There is no data on which the general incidence of yaws or of syphilis or of both can be arrived at.
2. Yaws has a greater incidence in the country as a whole than has syphilis.
3. Syphilis is more commonly met with in the urban or settled areas than is yaws, while yaws is, broadly speaking, a disease of the reserves.
4. Syphilis appears to be more common in the Kavirondo than in other reserves.
5. In the districts where yaws affects a large proportion of the inhabitants, syphilis tends to be rare. The reverse may be the case, but the evidence on the point is insufficient.
6. The Machakos District, and also probably the Masai Reserve, is, comparatively speaking, free from both syphilis and yaws.
7. There is a large block of country to the south of Mount Kenya, comprising the districts of Fort Hall, Nyeri, and Meru, where syphilis is a negligible quantity, but the incidence of yaws is very high indeed.

**Yaws.**

The information contained at the end of the preceding section is of application to yaws as well as syphilis : attention is directed thereto.

Another considerable increase in the total of cases appears in the returns, though there is no guarantee that the figures are correct. The reasons therefor are those which have been referred to in the past. The comparative table of cases treated during the past five years is shown below :—

1926	...	...	...	...	66,883
1927	...	...	...	...	70,253
1928	...	...	...	...	85,617
1929	...	...	...	...	89,615
1930	...	...	...	...	103,711

With every succeeding year evidence is accumulated to the effect that yaws is a disappearing disease in, at any rate, the Kikuyu Province, where the system of dispensaries, at which treatment by injections of bismuth can be obtained, has been in operation longer and more extensively perhaps than elsewhere.

**Tuberculosis.**

The gradual increase in the number of cases treated at Government hospitals which has been recorded during previous year was continued during 1930. The totals are :—

1928	...	...	...	...	...	657
1929	...	...	...	...	...	676
1930	...	...	...	...	...	756

No figures exist on which a conclusion can be arrived at as to whether tuberculosis is increasing in incidence or severity throughout the country. The disease is not one with which Africans usually seek medical advice except in extreme cases.

Notifications in Mombasa and Nairobi were :—

	<i>Europeans.</i>	<i>Asians.</i>	<i>Africans.</i>	<i>Totals.</i>
Mombasa	...	1	18	87
Nairobi	...	3	8	39

The above figures are very similar to those of 1929.

All forms of the disease are met with in the country.

The special investigation at the Nairobi Jail on the incidence of tuberculosis which was commenced in 1929 was concluded in the year under review. It appeared that the admissions to hospital for tuberculosis had definitely increased during the years 1928 and 1929. It was not, however, certain that this was not, at any rate in large part, due to increased accuracy of diagnosis. It was evident, nevertheless, that tuberculosis is acquired in the prison, probably from the presence of unrecognized infective cases or is roused to activity in the prison.

Deaths from tuberculosis among prisoners totalled 9, of which 7 occurred at Nairobi, out of a total of deaths for all prisons of 29.

#### Leprosy.

Three hundred and forty-three new admissions for leprosy occurred during 1930; 38 cases remained from the previous year. The figures are closely approximate to those of 1929, but it is certain that the cases which came under observation afford no real indication of the amount of the disease at present in the country. It is probable that the incidence may be high in some districts.

#### Enteric.

The total number of cases reported for the year was less even than for 1929. Comparative figures are :—

	<i>Cases.</i>				<i>Deaths</i>	
1928	...	...	...	320	...	45
1929	...	...	...	107	...	25
1930	...	...	...	102	...	17

Of the above, 33 were reported from Nairobi, 41 from Mombasa, and 11 from Kisumu. Cases and deaths among natives total 82 and 16 respectively.

Laboratory classification of Widal reactions according to the organism concerned was :—

B. typhosus	...	...	...	...	32
B. para-typhosus A	...	...	...	...	1
B. para-typhosus B	...	...	...	...	3
B. para-typhosus C	...	...	...	...	1

#### Dysentery.

The total of cases of dysentery was very much lower than in 1929. The figures are 885 with 30 deaths, as against 1,382 with 57 deaths.

The classification of cases in the totals of the returns is :—

Amœbic	...	...	...	...	269
Bacillary	...	...	...	...	146
Undefined	...	...	...	...	470

The great drop in the general total is more than accounted for in the drop in the figures for "undefined." In this connexion, the increase which is noted in the returns for schistosomiasis may be significant.

On only two occasions was the amoeba histolytica detected during the year in examination of materials at the Laboratory.

#### Diphtheria.

A small number of cases of diphtheria has been reported as occurring every year since 1923. The year under consideration is no exception. The total (eleven) remains the same as in 1929, but the cases all occurred among Europeans and none were detected among either Asians or natives. Nine cases were reported from Nairobi and two from Mombasa.

The following table shows the incidence of the disease since it was first detected in 1924 :—

Year	Europeans	Asians	Natives	Total
1924	6	2	3	11
1925	2	..	..	2
1926	..	4	1	5
1927	3	1	..	4
1928	12	..	2	14
1929	3	..	8	11
1930	11	..	..	11

No deaths occurred in 1930.

#### Cerebro-spinal Fever.

A small epidemic occurred in the Machakos District, where a probable total of 113 cases occurred, of which 54 were admitted to hospital. Other cases came under observation at Nairobi and Kitui. As a result the total of hospital cases was 131, with 51 deaths, as against 61 and 17 deaths in the previous year. By the end of the year the outbreak appeared to have died out.

#### Anthrax.

Only 75 cases came under observation during the year, with 8 deaths, as against 125 with 11 deaths in 1929. Nairobi and Meru accounted for 33 and 19 cases respectively.

#### Undulant Fever.

Seventeen cases were recorded during the year, of which ten came under observation at Machakos, where cases have occurred with some regularity during past years.

#### Encephalitis Lethargica.

Three cases, all among natives, were reported. No deaths occurred.

#### (c) HELMINTHIC DISEASES.

There is no necessity to modify the statement previously made that helminthiasis is practically universal among the native population.

It has been suggested, as a result of histological examination, that fine cirrhosis of the liver is exceedingly common among natives, and may be due to the toxins of helminths.

#### Ankylostomiasis.

Reports indicate, as previously, that infestation with ankylostomes is common, though the condition of ankylostomiasis, as opposed to ankylostome carrier, is much more commonly observed at the Coast than elsewhere.

#### Ascariasis.

A total of 6,545 cases was returned. This figure can bear no relation to the total number of persons infected with ascaris, but it may serve as an indication of the importance of this parasite as a cause of morbidity, especially among children.

In one case, as a result of treatment, the large total of 475 parasites was recovered from one small child aged about eight. The figure might have been exceeded had the parents consented to a longer stay in hospital.

#### Taeniasis.

Infestation with taenia is commonly met with throughout the country. Large numbers of carcasses are condemned yearly, on account of measles, at the slaughter-houses where inspection is undertaken.

### Schistosomiasis.

As the routine examination of stools becomes more widespread as a result of the training of native laboratory assistants, it becomes more and more evident that schistosomiasis is far more common throughout the country than was formerly supposed. A total of 167 cases of schistosomiasis was returned, of which 51 are definitely specified as being of the rectal variety.

### VITAL STATISTICS.

The non-native population of the Colony was determined by census in 1926, the African population being estimated at the same time.

#### *Population of Kenya in 1926.*

Europeans	...	...	...	12,529
Asians	...	...	...	26,759
Arabs	...	...	...	10,557
Africans (estimated)	...	...	...	2,515,330

### REGISTRATION OF BIRTHS AND DEATHS.

Little progress can be recorded during the year in connexion with the registration of births and deaths, and the position remains unsatisfactory to a degree. Until the legislation regarding this matter has been brought into operation, accurate vital statistics cannot be produced. The figures which follow give some information in regard to the larger towns, but it is again necessary to note that they should be accepted with reserve.

### NAIROBI.

#### Health and Mortality—Vital Statistics.

##### A.—Population.

The estimated population, as at 31st December, 1930, was as follows :—

Europeans	...	...	...	...	5,000
Asians	...	...	...	...	16,000
Africans	...	..	...	...	28,000
					<hr/>
	Total all races	...	49,000		<hr/>

##### B.—Births.

One hundred and fifty-two European births were registered during the year as compared with 151 in 1929. Only European births are compulsorily notifiable.

##### C.—Marriages.

The following marriages were registered : European, 78; Other races, 19.

##### D.—Deaths.

The total number of deaths reported in Nairobi during the year was 987, equivalent to a crude death-rate for all races of 20.79 per thousand of population, compared with 17.91 in 1929, and 25.11 in 1928.

The number of deaths from all causes among persons stated to be normally resident in Nairobi was 769, equivalent to a recorded death-rate for all races of 16.20 per thousand of population, compared with 13.77 in 1929, and 17.94 in 1928.

Of the 769 deaths, 572 were of males and 197 of females.

Fifty-three deaths occurred among Europeans, equivalent to a rate of 11.83 per thousand.

Two hundred and twenty-eight deaths occurred among Asians, equivalent to a rate of 20.76 per thousand.

Four hundred and forty-eight deaths occurred among Africans, equivalent to a rate of 15.25 per thousand.

##### E.—Infant Mortality.

The total number of deaths in infants under one year of age was 159, or 20.67 per cent of the total deaths.

As there is no means of ascertaining the number of births during the year, no infant mortality rate can be stated.

Race.	INFANT DEATHS IN RELATION TO TOTAL DEATHS		
	Infants	Total	Percentage
Europeans ... .. .. ..	7	53	13·2
Asians ... .. .. ..	101	236	42·7
Africans ... .. .. ..	51	480	10·6
All races ... .. .. ..	159	769	20·6

The small percentage of native infant deaths is accounted for by the fact that the native infant population is comparatively small.

Seventy-one infant deaths, or 44.6 per cent of the total, were attributed to pneumonia.

#### MOMBASA.

##### Health and Mortality—Vital Statistics.

###### A.—Population.

In view of the census to be taken in March, 1931, no attempt was made to revise the figures quoted as the estimated population for 1929, which were as follows :—

Europeans ... .. .. ..	... .. .. ..	1,250
Indians ... .. .. ..	... .. .. ..	10,000
Goans ... .. .. ..	... .. .. ..	1,300
Arabs ... .. .. ..	... .. .. ..	7,000
Africans ... .. .. ..	... .. .. ..	27,000
Other races ... .. .. ..	... .. .. ..	300
Total all races ...		46,850

###### B.—Births.

Nineteen European births were registered, as compared with 23 in 1929.

###### C.—Marriages.

The following marriages were registered :—

European ... .. .. ..	... .. .. ..	86
Other Races ... .. .. ..	... .. .. ..	17

Many of the European marriages registered in Mombasa are between people belonging to other districts, and the figures are not therefore representative of Mombasa.

###### D.—Deaths.

Deaths from all causes reported as occurring among all races in Mombasa numbered 865, yielding, according to the estimate of population, a crude death-rate of 18.46 per thousand population, compared with 19.99 in 1929 and 19.44 in 1928.

Owing to the absence of registration of deaths, no attempt was made to calculate the recorded death-rate.

Of the 865 deaths reported, 556 were of males and 309 of females.

The following are the numbers and rates as affecting the various sections of the population :—

Race	Number of Deaths	Death Rate
Europeans ... .. .. ..	17	13·60 per thousand Europeans.
Indians and Goans ... .. .. ..	234	20·70 per thousand Indians and Goans.
Arabs ... .. .. ..	168	23·99 per thousand Arabs.
Africans ... .. .. ..	426	15·78 per thousand Africans.

**E.—Infant Mortality.**

The total number of infant deaths amounted to 163, or 18.6 per cent of deaths at all ages.

The incidence of infant deaths among the various races was as follows :—

Race	Infant deaths	Total deaths	Percentage
European .. ..	2	17	11·8
Indians and Goans .. ..	82	234	34·6
Arabs .. ..	46	163	27·4
Africans.. ..	33	426	7·7

Sixty-six infant deaths, or 40 per cent of the total, were attributed to pneumonia.

**KISUMU.****Health and Mortality—Vital Statistics.****A.—Population.**

The estimated population in 1930 was as follows :—

Europeans ...	...	...	...	170
Asians ...	...	...	...	1,280
Africans ...	...	...	...	3,600
Total all races ...				5,050

**B.—Deaths.**

The total number of deaths reported was 124, of which 41 were Asian and 83 African. No European deaths occurred.

**NAKURU.****Health and Mortality—Vital Statistics.****A.—Population.**

The estimated population in 1930 was as follows :—

Europeans ...	...	...	...	546
Indians ...	...	...	...	943
Other Races ...	...	...	...	654
Total all races ...				2,143

**B.—Births.**

Twenty-six European births were registered during the year.

**C.—Deaths.**

The total number of deaths registered during 1930 was 164, of which 145 were resident and 14 non-resident, the remaining five being reported from outlying districts.

**ELDORET AND KITALE AND THE UASIN GISHU AND TRANS NZOIA DISTRICTS.****Health and Mortality—Vital Statistics.****A.—Population.**

The estimated population in 1930 was as follows :—

UASIN GISHU DISTRICT (INCLUDING ELDORET).				
Europeans ...	...	...	...	1,662
Indians ...	...	...	...	949
Goans ...	...	...	...	125
Other Races ...	...	...	...	133
Africans ...	...	...	...	20,661
Total all races ...				23,530

## ELDORET, ELGONVIEW, KAPSOYA, ORTLEPPVILLE AND WEST ELDORET.

Europeans ...	...	...	...	678
Indians ...	...	...	...	917
Goans ...	...	...	...	99
Other Races ...	...	...	...	101
Africans ...	...	...	...	2,248
			Total all races ...	4,043

## TRANS NZOIA DISTRICT (INCLUDING KITALE).

Europeans ...	...	...	...	1,015
Asians ...	...	...	...	680
Other Races ...	...	...	...	74
Africans ...	...	...	...	24,700
			Total all races ...	26,469

## KITALE TOWNSHIP.

Europeans ...	...	...	...	163
Indians ...	...	...	...	577
Goans ...	...	...	...	45
Other Races ...	...	...	...	34
Africans ...	...	...	...	852
			Total all races ...	1,671

*B.—Births.*

Sixty-one births were recorded in Eldoret and 33 in Kitale during the year.

*C.—Marriages.*

Sixteen European marriages were registered in Eldoret and five in Kitale during the year.

*D.—Deaths.*

European deaths were registered in all areas. Asian deaths were registered in Eldoret. African deaths were registered in Eldoret for the whole year.

The following figures are given for comparison with 1929 :—

	1929			1930		
	European	Asian	African	European	Asian	African
Eldoret and Uasin Gishu	14	9	54	16	4	62
Kitale and Trans Nzoia	6	..	..	4	..	19

A crude death-rate, based on the estimated population for 1930, is 5.7 per thousand for Europeans, as compared with 7.4 in 1929, and 16.0 in 1928.

The chief causes of death are pneumonia and broncho-pneumonia, which account for 33 out of a total of 105 deaths. Malaria and blackwater fever account for 9 deaths as compared with 6 in 1929.

## (1) GENERAL NATIVE POPULATION.

The estimate of native population has shown a steady increase during the past few years, and the total for 1929 was 2,930,604. The final figure for 1930 had not been arrived at at the time of writing this report, but the indications are that the increase of the past years will be maintained. In this connexion, however, it has to be remembered that registration of births and deaths among Africans is not compulsory, and that the estimates are arrived

at as the result of the hut count made for taxation purposes. The indications are that an actual increase is taking place and in this connexion it is interesting to note that during the sleeping sickness census conducted in Kavirondo during the year the total of persons examined exceeded the total estimate as shown in the official figures for the various locations. It will be remembered that a similar observation was made some years ago during the examination of the population, individual by individual, which took place in the Digo District as a preliminary to the institution of measures against hookworm.

Figures were obtained concerning the infant mortality among the adherents of a mission in the Teita Hills which keeps accurate records. The report is as follows :—

The following table shows the number of births and deaths of children each year from 1920 to 1930. Six hundred and ninety-eight families are involved :—

Year.	Births.	DEATHS UNDER—					Infant mortality per 1,000 births.
		1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	
1920	72	6	..	1	1	2	83
1921	83	8	1	5	1	1	96
1922	69	12	3	..	..	1	174
1923	95	20	3	3	..	1	210
1924	99	32	2	1	1	..	323
1925	92	22	2	2	..	..	240
1926	112	14	1	2	1	..	125
1927	119	11	.	1	1	..	92
1928	114	15	3	2	..	..	131
1929	134	19	1	..	..	..	142
1930	93	11	..	..	..	..	118

It has to be remembered that the above figures concern a picked population, who live in a state of civilization probably at a considerably higher level than the native under ordinary conditions; they probably give no indication of the general infant mortality among natives. Figures obtained previously from other sources have shown a very much higher rate.

## (2) GENERAL EUROPEAN POPULATION.

Such information as is available with regard to the vital statistics of this section of the population is contained in the figures relating to the various districts which appear previously.

Little information with regard to the sick and invaliding rates is available, as the unofficial section of the European population in large measure is attended to by private practitioners, and when needing hospital treatment are admitted to private nursing homes or non-Government hospitals.

Mention has been made in previous reports of the fact that the general European population consists mainly of individuals in age groups under 50, and that the majority live under conditions which are probably better than the average obtaining in England. There is no reason to modify this statement.

## (3) EUROPEAN OFFICIALS.

Taken as a whole, the figures for sickness, invaliding and death as relating to European officials show little difference from those of 1929, though there was a slight increase in the number of deaths, which total seven as against three. The main causes of sickness were malaria and influenza.

Comparative figures for in-patients and out-patients are :—

	<i>In-patients.</i>	<i>Out-patients.</i>
1928	... 1,276	... 569
1929	... 1,376	... 635
1930	... 1,443	... 978

The causes of death were :—

Malaria	...	...	...	...	3
Blackwater	...	...	...	...	1
Pneumonia	...	...	...	...	1
Ulcer of duodenum	...	...	...	...	1
Pleurisy	...	...	...	...	1

The number of invalidings was less in 1930 than in the previous year, the figures being 10, as against 16. The details are :—

Chronic nephritis	...	...	...	...	1
Tuberculosis of lung	...	...	...	...	1
Malaria	...	...	...	...	2
Disordered action of heart	...	...	...	...	1
Chronic bronchitis	...	...	...	...	1
Debility	...	...	...	...	1
Fractured skull	...	...	...	...	1
Concussion	...	...	...	...	1
Neuritis	...	...	...	...	1

TABLE SHOWING THE SICK, INVALIDING AND DEATH-RATES AMONGST EUROPEAN OFFICIALS IN THE COLONY AND PROTECTORATE OF KENYA

		1928	1929	1930
Total Number of Officials Resident	... ..	2,171	2,297	2,280
Average Number Resident..	.. ..	1,513	1,629	1,717
Total Number on Sick List	.. ..	1,276	1,376	1,462
Total Number of Days on Sick List	.. ..	8,734	9,723	9,596
Average Daily Number on Sick List	.. ..	23.86	26.64	26.29
Percentage of Sick to Average Number Resident	..	1.92	1.63	1.53
Average Number of Days on Sick List to each Patient	..	6.84	7.07	6.56
Average sick time to each Resident	.. ..	7.04	5.97	5.59
Total Number Invalided	.. ..	17	16	10
Percentage of Invaliding to Total Residents	.. ..	.78	.70	.44
Total Deaths	.. ..	3	3	7
Percentage of Deaths to Total Residents..	.. ..	.14	.13	.31
Percentage of Deaths to Average Number Resident	.. ..	.24	.18	.41
Number of Cases of Sickness contracted away from Residence	.. ..	—	—	—

#### (4) NON-EUROPEAN OFFICIALS.

The statistics for 1930 show a small though distinct increase in the amount of morbidity, with resulting increase in loss of time through sickness.

The most frequent causes of sickness were malaria and influenza.

The comparative figures for in-patients and out-patients are as follows :—

	<i>In-patients.</i>	<i>Out-patients.</i>
1928	... 4,188	... 2,875
1929	... 4,782	... 2,677
1930	... 5,022	... 5,536

Deaths numbered 18, and were due to the following causes :—

Blackwater fever	...	...	...	3
Pneumonic plague	...	...	...	1
Tuberculosis of lung	...	...	...	2
Septicæmia	...	...	...	1
Diabetes	...	...	...	1
Arterio sclerosis	...	...	...	1
Gangrene of lung	...	...	...	1
Asthma	...	...	...	1
Lobar pneumonia	...	...	...	5
Appendicitis	...	...	...	1
Acute nephritis	...	...	...	1

It will be observed that in only four cases were what are known as tropical diseases involved.

Invalidings were rather less than in 1929. The causes were :—

Chronic asthma and emphysema	...	1
Carcinoma of rectum	...	1
Neurasthenia	...	2
Tuberculosis	...	2
Melancholia	...	2
Presbyopia	...	1
Fracture of patella	...	1
Chronic nephritis	...	1

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TABLE SHOWING THE SICK, INVALIDING AND DEATH-RATES AMONGST NON-EUROPEAN OFFICIALS IN THE COLONY AND PROTECTORATE OF KENYA.

		1928	1929	1930
Total Number of Officials Resident	.. .. ..	3,059	3,224	3,365
Average Number Resident..	.. .. ..	2,499	2,694	2,882
Total Number on Sick List	.. .. ..	4,188	4,287	5,022
Total Number of Days on Sick List	.. .. ..	22,591	24,237	28,040
Average Daily Number on Sick List	.. .. ..	61.99	66.40	76.82
Percentage of Sick to Average Number Resident	..	2.49	2.46	2.67
Average Number of Days on Sick List to each Patient	..	5.42	5.65	5.58
Average sick time to each Resident	.. .. ..	9.01	8.99	9.73
Total Number Invalided	.. .. ..	8	15	11
Percentage of Invaliding to Total Residents	.. ..	.26	.46	.33
Total Deaths	.. .. ..	12	11	18
Percentage of Deaths to Total Residents..	.. ..	.39	.34	.53
Percentage of Deaths to Average Number Resident	..	.48	.41	.62
Number of Cases of Sickness contracted away from Residence	.. .. .. ..	—	—	—

### III.—HYGIENE AND SANITATION.

#### A.—General Review of Work Done and Progress Made. (1) PREVENTIVE MEASURES.

As regards preventive measures undertaken by the Department, the year 1930 may be described as one of distinct progress. Both in the native reserves and in the settled areas, a steady advance can be recorded; much useful work has been accomplished, and a gradual improvement in the standard of living can now be seen in many districts. The additional staff sanctioned in 1929 became fully effective in the period under review, enabling more attention to be paid to the prevention of disease as opposed merely to the treatment of the sick. Preventive measures were placed on a more organized basis, and activities were extended to a number of new areas.

In the native reserves, to which the greater proportion of the new staff was posted, educational health propaganda was intensified, the results of this most important activity of the Department being most encouraging. Improved types of housing are being constructed in many districts, numerous latrines have been provided and in most cases are being used, and improvements in general sanitary conditions are gradually being introduced.

In the town and settled areas the preventive measures instituted in past years have been maintained, and although progress can be recorded activities have been retarded to some extent by the economic situation, which was tending to become acute about the middle of the year.

#### MOSQUITO AND INSECT-BORNE DISEASES.

##### Malaria.

Malaria is the most important disease with which the Colony has to contend, as the morbidity and mortality which it causes still remain formidable. During the period under review the disease did not assume epidemic proportions in any district, and its incidence and severity were considerably

less than in some previous years. As a result of the lower incidence of the disease, which was almost certainly due to factors beyond control, and which are as yet imperfectly understood, an impression has been gaining ground that the menace of malaria has been exaggerated in the past. The lessons of recent epidemics have to a large extent already been forgotten, and it has been a matter of some difficulty to maintain the interest of the public in anti-malarial measures. The prevailing depression, which has necessitated a careful scrutiny of all expenditure, both public and private, has not tended to ease the situation. The importance of the disease from the economic aspect is not yet fully appreciated, and the present position is somewhat disquieting. Every opportunity is being taken, however, to interest all sections of the community in the malaria problem by means of continued propaganda.

In both urban and rural areas throughout the Colony it has been the policy of the Department to accept malaria as being a "social" disease, and preventive measures in general have been based on this conception. By the improvement of sanitation and by the adoption of a higher standard of living, more particularly amongst the large African population, which is the reservoir of the disease, a considerable reduction in both the incidence and severity of malaria can with confidence be expected. It is on these lines that malaria is being attacked in Kenya, and except in townships and other special areas this indirect method of attack would appear to be the only feasible procedure. In urban areas, where financial circumstances permit, the destruction of mosquitoes by anti-larval and other direct measures is of course being undertaken, and these routine measures have already been attended with considerable success. Every endeavour is being made to provide improved health services in all districts, and although a number of years must elapse before the general standard of living amongst the bulk of the population can be raised to any appreciable extent, distinct progress can already be recorded in some areas.

The Report of Colonel S. P. James, Adviser on Tropical Diseases to the Ministry of Health in England, who visited Kenya in 1929 to advise on anti-malarial measures, was received early in the year. The information and suggestions contained in this report have been extremely useful, and action has already been taken to give effect to many of the recommendations. Careful consideration has been given to all the recommendations made, but financial and other circumstances have necessitated postponement of action in regard to a number of them in the meantime.

The necessity for further malaria research, both in the laboratory and in the field, is fully appreciated, and during the year investigations have been carried out on the following lines:—

- (a) A medical officer was seconded to the Laboratory for malaria research, and this officer, together with one laboratory assistant, has been engaged on this work.
- (b) Mobile units, consisting of European field assistants with trained African staff, were maintained in the Uasin Gishu and Trans Nzoia districts for the purpose of investigating mosquito conditions.
- (c) Routine entomological investigations were continued or inaugurated in about twenty different parts of the Colony, and malaria control measures based on the investigations have already been instituted at a number of stations.
- (d) Experiments in connexion with the control of anopheline mosquitoes by means of paris green were continued at Kitale. The results obtained indicate that it may be possible to substitute this method of control for that of oiling at a number of places, with consequent financial saving.
- (e) Five additional departmental stations for the collection of meteorological data in connexion with the study of disease were established during the year.
- (f) The farm medical officer continued his investigations in regard to the endemicity of malaria and the health conditions of native employees in the Trans Nzoia district.
- (g) Routine examinations of blood slides, spleen, etc., amongst sample populations in the reserves were carried out by a number of medical officers.

(h) The fee for the examination of blood-slides was abolished, and by a municipal by-law the notification of malaria was made compulsory in Nairobi.

Anti-malarial measures based on these investigations and on the advice and suggestions contained in Colonel James's Report were carried out in a number of places as follows :—

(a) In Nairobi, work was continued on the anti-malarial schemes commenced in 1929, and during the year the sum of £20,000 provided by Government for anti-malarial measures in the town was fully expended. Consideration was given by the Municipal Council as to what further measures, to be financed out of a loan, should be undertaken in fulfilment of the undertaking to contribute on a pound-for-pound basis with Government in works of this nature, but no decision had been arrived at by the end of the year. About ten thousand yards of concrete canal have now been constructed in natural stream-beds in the town, realignments being carried out where necessary. Although considerable improvement has been effected by this canalization of streams, the old stream-bed has in many instances not been filled in, nor the surrounding ground consolidated, with the result that many mosquito breeding places still exist in the vicinity of the canals. Arrangements have also still to be made for the proper maintenance and repair of these canals. It is to be regretted that no action has yet been taken to deal with the Nairobi Swamp, an important breeding-ground in the centre of the town. Acquisition proceedings which were being considered had to be abandoned, but it is hoped that adequate action will now be taken by the Municipal Council under the Prevention of Malaria Ordinance, 1929, to eliminate mosquito-breeding in this area. As the swamp is situated in close proximity to the most congested areas of the town, the necessity for action is obvious. In addition to the anti-malarial works already mentioned, the routine oiling of breeding grounds was also carried out throughout the year, approximately nine thousand gallons of oil mixture being used for this purpose.

(b) In Mombasa, a scheme for the drainage of the area known as the "Rice Swamp," by means of subsoil drains, was approved and effected. The routine searching of houses, gardens, vacant land and other potential breeding places was also undertaken, and oiling carried out where necessary.

(c) In the smaller townships, numerous breeding grounds have now been eliminated by means of filling and draining, and at Eldoret and Kitale in particular a marked improvement has been effected. Although much remains to be done, some progress in connexion with anti-malarial works can also be recorded at Kisumu. Systematic oiling was carried out as a routine measure in most of the smaller townships.

(d) In the rural settled areas, improved sanitary conditions in general have reduced the number of potential breeding grounds to some extent. Better housing is gradually being adopted.

(e) In the native reserves, no direct anti-malarial measures have been carried out, but by the end of the year sanitary inspectors had been posted to seven native reserves with a view to assisting the natives to improve their standard of living. Efforts in this direction are still in their infancy, but in at least two reserves the most encouraging results have been obtained. Treatment facilities have also been improved by the systematic distribution of quinine in several areas, and by the general extension of health services.

(f) The Administration of the Kenya and Uganda Railways and Harbours is fully alive to the importance of anti-malarial measures, and during the year many breeding grounds were eliminated and other improvements effected in the areas under its control.

Whilst the preventive measures which are being undertaken are beginning to have some influence on the incidence of the disease, the menace of malaria to the country as a whole still exists, and further epidemics are to be expected. In a country where malaria is endemic it is therefore of the utmost importance that artificial mosquito breeding-grounds should not be created in the process of development. In this respect activities in connexion with road-construction give rise to considerable anxiety. Borrow pits, from which road material has been extracted, are common features throughout the Colony, and new pits are continually being excavated. In the past, little attention has been paid to the siting of these pits, with the result that filling or draining is often difficult

and expensive. Whilst the cost of road construction must not be unnecessarily increased, more consideration should be given to the siting of these excavations, in order that they may be filled or drained wherever possible. Attention has been drawn to this matter on numerous occasions, but little action has yet been taken. As many of these pits are situated in the vicinity of human habitations, the matter is of importance in connexion with malaria control.

#### **Trypanosomiasis.**

During the year a medical officer was posted to the Nyanza Province in order to carry out an investigation and survey in regard to trypanosomiasis. As a result of these investigations some valuable information is now available regarding the incidence of the disease and the extent of the area affected. Hitherto preventive measures have been limited to the treatment of cases discovered, although bush clearing on a minor scale has been undertaken in a few areas. The recent investigations have indicated the necessity for more extensive control measures, which are receiving consideration at the present time.

#### **EPIDEMIC DISEASES.**

##### **Plague.**

Throughout the Colony, plague was rather more prevalent than during the previous year, and an outbreak of the disease also occurred in Nairobi. In the native reserves and settled areas preventive measures were largely confined to the inoculation of immediate contacts and persons living in the neighbourhood of the outbreak. In Nairobi, control measures also included the demolition of plague-infected dwellings, the rat-proofing of godowns, and the repair and cleansing of rat-infested premises. The destruction of vermin was also carried out as a routine measure.

The number of rats which have been destroyed in the three oldest centres during the past three years is as follows :—

	1928.	1929.	1930.
Nairobi	... 59,482	... 8,667	... 10,767
Mombasa	... 32,596	... 55,782	... 59,000
Kisumu	... 20,337	... 19,862	... 9,788

Routine rat destruction was also continued in the North and Central Districts of the Kavirondo Native Reserve, 710,595 rats being destroyed during the year.

Under the conditions which exist in the native reserves there is, however, no evidence to suggest that rat destruction conducted by the only methods at present available can have any influence on the incidence of plague. Research work in connexion with plague has been continued and during the year rat and flea surveys were carried out at six stations, in addition to minor investigations which were undertaken at a number of other places.

In June, Sir Edward Thornton passed through Kenya on his way to Uganda to conduct an investigation into plague in that Colony. All available information and data in relation to the disease collected in this Colony were placed at his disposal.

Plague, like malaria, must be recognized as a "social" disease, and its continuance in the areas where it is endemic is largely dependent on the conditions met with amongst a population with a low standard of living. By improving the conditions of life, more especially in regard to education, agriculture, health services, housing, sanitation and civilization generally, plague and other social diseases will gradually disappear.

Towards the end of the year, experiments in connexion with the de-verminization of plague-infected premises by means of cyanogas dust were commenced on the lines suggested in Sir Edward Thornton's report, and these experiments will be continued during the present year.

##### **Smallpox.**

As a result of the outbreak of smallpox which occurred at Mombasa, the Municipal Board made an order under section 106 of the Public Health Ordinance requiring compulsory vaccination, re-vaccination or examination of the whole population. In less than a fortnight, over seventy thousand persons were vaccinated, and after the end of February no further cases were reported.

Vigorous vaccination campaigns were also carried out in the districts to the north and south of the Island.

The risk of the introduction into the Colony generally, and Mombasa in particular, of smallpox from India is ever present, as the time taken by ships to make the voyage from Bombay to Mombasa is less than the usual incubation period of the disease. A passenger may be landed at the port apparently well, yet actually with the disease in the incubation stage, and therefore not recognizable. Such a person will develop smallpox a few days later, when all trace of him has probably been lost, and will thus serve as a source of infection which may give rise to an epidemic. In an endeavour to minimize this danger, immigrants from India are liable to quarantine unless they are in possession of a certificate of recent vaccination. It cannot, however, be considered that this precaution provides a complete safeguard; reliance must therefore continue to be placed on the maintenance of a high standard of immunity among the population of the town by means of effective and frequent vaccination. A great obstacle in the way of attaining this aim is the difficulty of enforcing the vaccination of infants in the absence of the registration of births.

During the year, the prevalence of smallpox in the neighbouring territory of Tanganyika caused some uneasiness, and in order to protect the Colony from this source of infection vaccination campaigns were undertaken in the native reserves bordering on that territory.

In addition to the vaccinations performed in the native reserves, the routine vaccination of prisoners, police recruits, recruited labour and immigrants was undertaken as usual throughout the year, the total number of vaccinations performed in 1930 being 169,445. The lymph prepared at the Laboratory in Nairobi continues to give satisfactory results.

#### **Dysentery.**

With the exception of minor outbreaks, no epidemic has occurred for a number of years, and no special preventive measures have been undertaken against the disease.

#### **Enteric.**

Enteric did not appear in epidemic form in 1930, but sporadic cases and minor outbreaks continue to be reported from nearly all parts of the Colony. Enteric is a disease associated with primitive sanitation, and having regard to existing conditions in most areas its incidence is surprisingly low. The prevention of enteric and other intestinal diseases is entirely dependent on the improvement of general sanitary conditions.

#### **Tuberculosis.**

Although tuberculosis is notifiable, no reliable information is yet available in regard to its real incidence. The problem of prevention is a difficult one, as housing, feeding and general economic conditions play a great part in the incidence of the disease. Tuberculosis is another "social" disease, and the conditions under which the African lives in both towns and in the reserves are almost ideal for its spread. Until these conditions are materially changed but little can be done in the way of prevention. The provision of improved treatment facilities is also becoming increasingly urgent, as treatment of the early case, isolation of the advanced case and observation of contacts are essential in any scheme of tuberculosis prevention. Under existing conditions the control of the disease presents great difficulty, and its increasing prevalence is a matter for grave concern. Whilst the Colony is remarkably free from bovine tuberculosis as compared with other countries, cases in cattle and pigs are not infrequently met with, and there is some evidence to suggest that bovine tuberculosis is also increasing.

### **HELMINTHIC DISEASES.**

#### **Ankylostomiasis.**

Cases of ankylostome infestation are observed in all parts of the Colony, but ankylostomiasis appears to be confined almost entirely to the Coast area. The preventive measures instituted against this disease in the Digo, Malindi, and Teita Districts were continued during the year. Sanitary improvements have been maintained, and improved types of housing are to be seen in several locations. Although unremitting effort is required to foster and maintain the

interest of the natives in these improvements, progress is being made, and more sanitary habits are gradually being acquired. The control measures which have been taken in regard to ankylostomiasis in these districts are undoubtedly beginning to have some influence on the incidence and severity of the disease.

#### Other Helminthic Diseases.

Cases of taenia and ascaris infestation are also met with throughout the Colony, the distribution of these diseases varying to some extent in different areas.

Preventive measures have included the treatment of individuals, the prosecution of latrine campaigns in the native reserves, and the dissemination of knowledge regarding the steps which should be taken to avoid infestation. In the case of taeniasis, the institution of meat inspection has also been arranged wherever possible. As meat inspection can only be carried out efficiently at certain centres, and as the introduction of latrines on a large scale must be a gradual process, treatment of cases must remain the chief preventive measure for a number of years.

### (II) GENERAL MEASURES OF SANITATION.

During the past two years, general measures of sanitation in the larger centres of population have been carried out under the direction of the local authorities established under the Local Government Ordinance. In Nairobi and Mombasa, Government public health staff has been largely replaced by municipal staff, although a few officers still remain seconded from Government.

In the other townships, public health staff is still provided by Government, but this staff acts almost entirely in an advisory capacity to the local authorities concerned, the local authorities being responsible for the initiation and execution of all public health and sanitary measures. Without exception, these local authorities are taking a real interest in the promotion of public health, and marked improvements in sanitation are now to be seen in the areas under their control.

#### Sewage Disposal.

Nairobi still remains the only town in the Colony which is provided with a water-borne sewage disposal system. The system is confined to the centre of the town, but one further sewer was completed in 1930. In the residential areas, sewage disposal is being obtained to an increasing extent by means of septic tanks, but the single-bucket system of conservancy still remains the chief method of disposal. No provision is made for the cleansing of the buckets, and the service rendered can only be described as far from satisfactory. No conservancy is undertaken in the outlying areas, where sewage disposal is generally effected by means of pit latrines, septic tanks and soakage pits. As many years must of necessity elapse before the water-borne sewerage system can be extended to all parts of the town, the reorganization of the present conservancy system becomes increasingly urgent. At the same time, the preparation of a complete sewerage scheme for the whole of the municipal area should receive serious consideration.

In Mombasa, sewage disposal is obtained by means of soakage pits and a double-bucket system of conservancy. The need for a system of sewers is, however, becoming acute, more particularly in the more congested district of the Island. The matter has received consideration, and the Municipal Board has included the cost of a sewerage survey in its loan proposals.

In the other towns of the Colony, sewage is disposed of by means of the single-bucket system of conservancy, or by soakage pits. These methods cannot be described as altogether satisfactory, but some years must elapse before the installation of sewers in these towns becomes a feasible proposition. The preparation of sewerage schemes should not, however, be unduly delayed, as several local authorities have already experienced difficulty in obtaining the requisite number of Africans of the sweeper class to maintain an efficient conservancy service. The ultimate disposal of night soil in all the towns which have conservancy systems is carried out by the trenching method, except in Mombasa, where the night soil is discharged into the sea. In the absence of sewers, the disposal of sullage water presents many difficulties in all the towns.

### **Scavenging and Refuse Disposal.**

The collection and disposal of refuse in the towns of Kenya cannot yet be described as satisfactory, although a gradual improvement is taking place. Although most local authorities now insist on premises being provided with an approved type of refuse bin, methods of collection leave much to be desired. Dumping on the outskirts of the town is still the chief method of disposal, although incinerators are in use in a number of townships.

In Nairobi, the refuse collection service is practically confined to the old area of the town, and antiquated ox-carts are still being used to convey the refuse to the dumps. As a modern refuse destructor is at present in course of construction, an opportunity should be taken to reorganize the whole service. The extension of the service to the suburban areas should also be considered.

In Mombasa, the scavenging and refuse collection service operates in as efficient a manner as circumstances permit, but a modern refuse destructor is urgently required.

### **Drainage.**

In the absence of proper drainage systems, great difficulty is experienced in regard to the disposal of waste and storm water in all the towns of Kenya. The lack of drainage facilities necessitates waste water being disposed of by means of subsoil or surface irrigation methods, which entail pollution of the soil, and which facilitate the creation of mosquito breeding-places. Whilst open concrete drains have been provided to some extent in all the larger towns, earth cuttings are still the most common form of drainage. Earth drains cannot be kept in a sanitary condition, and many of the nuisances and offensive features met with in the urban areas are due to the lack of proper drainage facilities.

In the commercial area of Nairobi, considerable improvements in connexion with drainage have taken place during the past few years, and the system has been extended to some extent. Anti-malarial measures in Nairobi and elsewhere have also included the provision of additional drainage. With increasing development, the question of adequate drainage facilities must be considered in connexion with all urban areas.

### **Water Supplies.**

All of the more important towns in the Colony have now been provided with water supplies, which, in most cases, can be described as fairly adequate and satisfactory. The provision of supplies for a number of the smaller towns and stations is also receiving consideration, and in some instances supplies have already been provided. In Nairobi the position is still far from satisfactory, and although large schemes have now been discussed for several years, none has yet taken material form, and no improvement in the water supply can be recorded in 1930. As regards both quantity and quality, the supply leaves much to be desired. As the population is increasing rapidly, the provision of a pure and sufficient water supply is a matter of urgency which should receive consideration without further delay.

At Mombasa, work in connexion with the new water supply was continued throughout the year, and analysis of samples from the supply yielded satisfactory results.

No review of the position in regard to water supplies would be complete without reference to the native reserves, where the need for adequate supplies is becoming increasingly urgent in many areas, on both sanitary and economic grounds. Boring experiments have already been carried out in some areas, but the whole question requires further consideration in connexion with the general development of the native reserves.

### **Sanitary Inspections.**

Sanitary inspections and the abatement of nuisances are now carried out in all areas under the general supervision and direction of the local authorities. By the appointment of several municipal sanitary inspectors in Nairobi and Mombasa in 1930, Government was able to transfer sanitary inspectors, who had been seconded to those municipalities, to other areas. These officers were posted to rural settled areas and native reserves, thus enabling more efficient sanitary control to be exercised in a number of districts.

The activities of sanitary inspectors in settled areas have been chiefly concerned with the abatement of nuisances, the inspection of premises subject to special control under municipal or township by-laws, the inspection of buildings in general, and with control measures in connexion with malaria and plague.

In the larger towns, numerous nuisances were abated and improvements in sanitation were maintained. Sanitary improvements were also effected in a number of the smaller townships, and many trading centres received some attention. In the rural settled areas, some sanitary progress can be recorded, but the economic situation retarded activities to a great extent.

In the native reserves, the activities of sanitary inspectors are, perforce, largely educational. In the small trading centres, action on the usual lines for the abatement of nuisances has to be taken, but, outside these, instruction and help has to be given if any improvement in conditions is to be brought about. It is useless to attempt otherwise to deal with sanitary problems if the population is ignorant of the rudiments of healthy living.

By the posting of sanitary inspectors to native reserves a distinct advance in sanitation has been achieved in several districts, more particularly in connexion with housing and the provision of latrines.

### **(III) SCHOOL HYGIENE.**

The school accommodation provided by Government for European scholars can now be described as extremely satisfactory, as a large building programme has been completed during the past few years. By the end of 1930, additional accommodation became available by the completion of the secondary school for boys at Kabete. Modern buildings have now been provided at all the larger centres of population, and children living at a distance from these centres are enabled to make use of these facilities by means of the well-equipped modern boarding-houses. New and modern school accommodation has been provided in Nairobi and Mombasa for the Indian community. Schools have been built elsewhere for the African community, and additional accommodation is in course of construction.

During 1930, the medical inspection of school children was continued, a whole-time medical officer, with a European assistant and two nursing sisters, being engaged on this work. The report of the School Medical Officer is attached as Appendix A.

### **(IV) LABOUR CONDITIONS.**

#### **General Industrial Conditions.**

In 1930, general industrial conditions remained much the same as in previous years, but year by year the development which is taking place is responsible for the employment of an increasing number of African labourers. During the period under review, the labour supply was plentiful, and in practically all districts exceeded the demand. The relationship between employer and employed usually gives little cause for complaint, and employers in general are taking an increasing interest in the welfare of their African employees.

The Senior Medical Officer (Labour) continued to be seconded to the Native Affairs Department, and acted as Principal Inspector of Labour under the direction of the Chief Native Commissioner.

In addition to the supervision and control thus exercised, investigations in regard to the health of African employees have also been continued by the Farm Medical Officer in the Trans Nzoia District.

#### **Labour Conditions on Estates and Plantations.**

In the settled areas, improvements in the conditions under which African labourers live and work have been maintained, but except in a few areas little progress in the direction of further improvements can be recorded. General financial stringency and a plentiful labour supply were probably the chief factors which retarded progress. The desirability of improving labour conditions is now appreciated by the majority of employers, but such matters as housing, sanitation, feeding and medical attention still leave much to be desired, and material improvement must be effected before the position can be described as satisfactory. Much has been accomplished by persuasion and

propaganda, but the time would now appear to have arrived when specific legislation with reference to the employment of African labour should be seriously considered. Many employers are prepared to consider improvements, but are unwilling to carry them out until compelled to do so by law. The reasons usually given are, in the case of large firms, that directors will not sanction expense which is not compulsory, and, in the case of small employers, that they will not spend money until their neighbours have been compelled to do so as well. They both point out that if they erect permanent housing now, legislation in future may condemn the type as unsuitable. They also suggest that Government, as the largest employer of labour, should give a lead in this matter, and it must be admitted that Government housing for natives in most places is far from satisfactory. Money has been wasted by some employers in erecting buildings of unsuitable design, although the material and workmanship is often good; but in the absence of legislation little control can be exercised.

#### **Labour Conditions in Townships.**

Owing to the rapid development which is taking place at all the larger centres, the problem of providing adequate housing accommodation for African employees is becoming acute. In Nairobi, the Municipality has now provided accommodation for a considerable number of natives, but the vast majority of the African population is still housed in huts owned by natives, who add to their income by letting one or more rooms in "lodgings." The accommodation provided is extremely unsatisfactory, as it is expensive, inadequate and insanitary. The question is receiving serious consideration at the present time, and it is hoped that marked improvement will take place in 1931. The Municipality has erected several experimental houses, and when suitable types have been decided upon it is proposed to proceed with the construction of a new native location.

Government has built a good location adjoining the Race-course, which provides accommodation for a number of its employees, but additional housing is urgently required. The housing provided for many of the native labourers employed by various departments of Government leaves much to be desired. The barracks which house the King's African Rifles are unsatisfactory to a degree, and their demolition and replacement by modern buildings should be undertaken without delay. At nearly all towns and administrative centres where Africans are employed by Government, the provision of modern sanitary housing is a matter which merits consideration. The Administration of the Kenya and Uganda Railways and Harbours has now provided excellent housing throughout the Colony for the vast majority of its employees, and in this respect can be described as a model to other employers.

At Mombasa, with the exception of Railway housing, practically no permanent accommodation has as yet been provided for African employees, who still remain housed in huts. During the year numerous huts were erected in the new native areas, which has relieved the congestion to some extent. The new type of hut is much superior to the old, and where they have been built as part of an orderly scheme, comprising building lines, open spaces, streets, etc., great improvement in sanitation and amenity has resulted. As a temporary expedient, this type of accommodation has proved fairly satisfactory, but the problem of housing the African labourer in Mombasa has not yet been solved.

At Eldoret, the new native location was completed during the year. This location represents a great advance on anything which has previously been attempted in the Colony in connexion with native housing, and excellent accommodation is now provided for African employees in that town.

#### **Labour Employed on Railway Construction.**

During the year several thousand African labourers were employed in the construction of the Thomson's Falls, Kisumu-Yala and Naro Moru-Nanyuki branch lines. The conditions of employment were generally satisfactory, except on the Naro Moru branch, where towards the end of the year insufficient attention was being paid to sanitation, housing and feeding. The unsatisfactory conditions were brought to the notice of the contractor concerned, and were thereupon remedied. Adequate medical facilities were provided by the Railway Administration, the health of the labourers gave little cause for concern, and the death-rate was low.

**Dietary of Employed Labourers.**

Whilst there is a tendency amongst private employers to improve the rations of their native labourers, 2 lb. of maize meal daily, plus a little salt, remains the usual ration issued, although in an increasing number of cases a weekly issue of meat is also made. A diet of this nature cannot be considered satisfactory. It is, however, gratifying to be able to report that the necessity for issuing a ration which is not only adequate in quality and quantity but is also physiologically correct is gradually being appreciated.

Throughout the Colony, Government employees receive much the same rations as those issued by private employers. As far back as 1927, representatives of several departments met to discuss this question, when it was unanimously agreed that a balanced diet scale should be adopted for all Government labourers. Such a scale was drawn up at the meeting, but it has not yet been introduced. It cannot be too strongly emphasized that no material improvement in the conditions under which African labourers live and work can be achieved until Government itself pays more attention to the housing, feeding and general welfare of its labour force.

**Medical Care of Employed Labourers.**

The medical care of employed labourers provides a problem the solution of which is not easy, and in most parts of the Colony present arrangements are extremely defective. Government does not accept responsibility for providing medical attention or hospital accommodation for labour which is privately employed, and few plantations or estates are large enough to justify the provision of properly equipped hospitals or the employment of qualified medical practitioners. On some estates, African dressers are employed, but the supply of even partially trained dressers is inadequate. Unless an estate happens to be near a Government hospital, the labourers as a rule lack proper medical attention and sanitary supervision. The law states that an employer must provide medicines for his labourers, and medical attendance in the case of serious illness, if procurable, but in many parts of the Colony such attendance is extremely difficult to procure. Employers in the great majority of cases do their best to meet the difficulties of the situation, but the present position is by no means satisfactory. In several districts meetings have been held by employers to discuss the possibilities of providing hospital accommodation and medical attendance by a system of combining estates for this purpose. As many difficulties were encountered their efforts proved unsuccessful, and the position remains much the same as before. Additional native hospitals in the non-native areas will have to be provided if the medical requirements of employed African labourers are to be adequately met. Experience would suggest that little progress will be made until Government becomes responsible for the provision of the medical facilities required. As regards the financial aspect of the question, schemes of this nature should be made self-supporting, interest and sinking fund charges on capital expenditure and running expenses being recovered from the employers by placing fees charged for the maintenance and treatment of patients on an economic basis.

**(V) HOUSING AND TOWN PLANNING.****Housing.**

As a result of the rapid development which has taken place during the past few years in all the larger centres of population, the situation in regard to housing accommodation has greatly improved, and in 1930 this improvement continued.

In the urban areas, the number of houses now available for the European section of the community appears to be sufficient, and for the most part this portion of the population is housed under satisfactory conditions. In the rural areas the European population has also improved its housing accommodation, many temporary structures now being replaced by modern buildings.

As regards the Asian community, the position is not so satisfactory, although a considerable improvement has been effected. In Mombasa, where a number of residential buildings have been erected, the supply of houses of a reasonably decent and convenient design is infinitesimal in comparison with the needs of the Asian population, by far the greater part of which is still forced to live in the dark, airless and generally insanitary conditions of the old town.

In Nairobi, the housing of the Asian community outside the commercial area is proceeding rapidly, and Government and the Railway Administration have built or are building large residential locations for their Asian employees, thus relieving the central areas.

In other towns, considerable building development is also taking place, but the bulk of the Asian population is still housed in insanitary slums.

As regards African housing in urban areas, the position is still less satisfactory, and although some additional accommodation was provided during the year the supply has not kept pace with the demand. The outstanding event of the year was the completion of the new native location at Eldoret, where some excellent modern housing has been provided for the African population of the town. Provision has been made for the accommodation of both married and single natives, and a few shops for native traders and an eating-house have also been provided. Modern locations built on similar lines would do much to solve the native housing problem in other urban areas. In Nairobi, several thousand natives are now housed under fairly satisfactory conditions, and the construction of additional accommodation is at present receiving consideration by the Municipal Council.

At Mombasa, the construction of numerous native huts has provided a temporary solution of the African housing problem. These huts are built of mud and mangrove poles, and are roofed with a coco-nut thatch or old petrol tins, a form of construction which must be considered as an expedient, and whilst no better expedient may present itself at the moment, it is well to avoid the illusion that the problem of native housing in Mombasa has been solved. The problem of African housing in the rural settled areas has been referred to in the section dealing with labour conditions. In the native reserves, whilst no improvement in housing on any large scale can yet be seen, improved types of housing are being built by individuals in nearly all districts. Increased trade, an improving economic position, and better educational facilities are changing the whole native outlook, and the construction of improved types of housing is only a matter of time. The provision of European sanitary staff for the native reserves is of great importance in connexion with the construction of housing and the improvement of sanitary conditions in general.

#### **Town Planning.**

Little material progress can be recorded during the year in regard to town planning in either Nairobi or Mombasa, but a considerable amount of preliminary work has now been completed. In Nairobi, the delay in formulating schemes for the town planning of certain areas has curtailed the activities of the Health Department to a considerable extent in connexion with the closing and demolition of insanitary buildings. Several of these schemes have now been completed, and a number of undesirable features should be removed from the town in the near future. Work has been continued in connexion with the control of development in the smaller townships, and the Municipal and Town Planning Engineer, acting in conjunction with the local authorities, has now prepared preliminary development plans for a number of these townships.

#### **(VI) FOOD IN RELATION TO HEALTH AND DISEASE.**

There is a considerable and accumulating amount of evidence to suggest that the dietaries of many of the tribes of Kenya are unsatisfactory, and during the year investigations in regard to this question were continued. In most reserves adequate food supplies are available, and even in districts where there is a shortage of certain foodstuffs additional supplies could be obtained without much difficulty. The real problem in connexion with the matter is the education of the African in regard to the use of a properly balanced diet. Educational propaganda to this effect is beginning to show some results, and an improved dietary is now being consumed by many of the more sophisticated natives. The consumption of meat is also becoming more common. Milk is not yet extensively used as an article of diet, except amongst a few pastoral tribes, and there is a distinct shortage of milk in many areas.

During the year, experiments were carried out in regard to the substitution of maize-meal by wheat-meal in native diets, with encouraging results.

**Inspection and Control.**

The routine inspection of meat, milk, and other foodstuffs was continued throughout the year at all the larger centres, and a certain amount of control was also exercised at all administrative stations to which European sanitary inspectors have been posted. For the greater part of the year a sanitary inspector was attached to the staff of the Port Health Officer at Mombasa, his activities being largely concerned with the inspection and control of imported food supplies.

The introduction of the Food and Drugs (Adulteration) Ordinance, which took place during the year, will do much to facilitate the control of foodstuffs in urban areas.

**Markets, Dairies and Slaughter-houses.**

Markets which are to be found in most towns in the Colony cannot be described as satisfactory, but some improvements were effected during the year. In Nairobi, the dilapidated Jeevanjee Market still remains, but it is hoped that it will be closed in 1931, as the contract for the new municipal market has already been let.

At Mombasa, work on the new market at Makupa was nearing completion by the end of the year.

In regard to dairies, many improvements have been effected in connexion with buildings, equipment and utensils at all the larger centres during the past few years. The milk trade is now largely in the hands of the European dairy farmer, and a higher standard of cleanliness in milk production and distribution is gradually being attained. The control of the native milk producer, to whom the elementary principles of hygiene and cleanliness are quite unknown, remains a difficult matter. The prohibition of this trade would seriously affect the milk supply in some towns, and the Asian and African communities would to a large extent be affected. The matter is receiving consideration, and attempts are being made to improve this source of supply.

In Nairobi and Mombasa, the slaughter-houses, owing to lack of space and convenience, can only be described as thoroughly unsatisfactory. From the public health point of view, one of the most urgent needs of these towns is the provision of modern slaughter-houses, together with the necessary equipment and apparatus, which should include cold storage facilities. Plans for the new slaughter-house at Nairobi have been prepared, and it is hoped that the new building will materialize during 1931. It is also hoped that the Mombasa Municipal Board's proposal to obtain loan funds for the construction of a new slaughter-house will be successful. There is still much room for improvement in connexion with the slaughtering of animals in most townships, but several of the more important centres have now been provided with fairly satisfactory slaughter-houses.

**Premises Used for the Sale of Food.**

In all urban areas, premises used for the manufacture, storage and sale of food have been subjected to frequent inspection, and many improvements have been effected.

**B.—Measures Taken to Spread the Knowledge of Hygiene and Sanitation.**

With a view to spreading the knowledge of hygiene and sanitation amongst all sections of the community, systematic propaganda has now become an important activity of the Department. Personal propaganda is being carried out to an increasing extent by medical officers and sanitary inspectors in the native reserves, and wherever possible the opportunity is taken of addressing Local Native Councils and other gatherings of natives on general health subjects and the improvement of sanitary conditions. In addition to the propaganda carried out by individual officers, health exhibits are also staged at agricultural shows. At the shows held in native reserves, the exhibits are arranged to attract the attention of the African and native assistants are provided to demonstrate the exhibits to numbers of their own race in their native tongue.

During the year, three health exhibits of this kind were organized in native areas, and health exhibitions on a larger scale were held in Nairobi and Mombasa.

The model village in the Central Kavirondo Reserve was completed, and model African homesteads were nearing completion in the North Kavirondo and Kikuyu Reserves by the end of the year.

Work in connexion with the preparation of cinematograph films has been continued, but owing to financial and other factors arrangements for the production and exhibition of local films are not yet complete.

In addition to departmental activities, the excellent propaganda carried out by Jeanes teachers must also be mentioned. Jeanes teachers are now stationed in a number of districts, and as a result of their efforts some elementary knowledge of hygiene and sanitation is gradually being imparted to the people. During 1930, a sanitary inspector was seconded to the Jeanes School for several months with a view to co-ordinating the activities of the Education and Medical Departments in connexion with the teaching of hygiene and sanitation.

Hygiene is a subject of instruction in all Government and State-aided schools, and an endeavour is being made to improve the teaching of this subject in order to promote the spread of knowledge in regard to hygiene and sanitation among the younger generation of all races. It must be emphasized that if successful results are to be obtained, educational health propaganda, especially in a native reserve, must go beyond the stage of theoretical instruction, and in this connexion the provision of adequate health staff to assist the people to improve conditions is of the utmost importance.

#### C.—Training of Sanitary Personnel.

No attempt has yet been made in Kenya to train African natives as sanitary inspectors, although a large number of Africans is employed in the Sanitation Division in various capacities. In several areas the training of African sanitary assistants has been undertaken, and where these natives have had some preliminary technical training their services have been extremely useful in assisting to improve general sanitary conditions. The training of African sanitary personnel cannot, however, under present conditions, be carried out successfully by individual officers in their own districts, and provision will eventually have to be made for the training of these assistants at some central depot organized on a basis somewhat similar to that of the school for Jeanes teachers.

#### D.—Recommendations for Future Work.

It is unnecessary to recapitulate the recommendations made in previous Annual Reports in regard to future work, but the importance of embarking upon a comprehensive policy of development in connexion with the native reserves must once more be stressed. Conditions in these reserves are changing rapidly, and a sound development policy would undoubtedly result in a marked increase in production and trade.

To provide medical relief for the large native population and to assist them in raising their general standard of living, an expansion of health services is urgently required.

Additional housing accommodation for Africans in properly planned locations is an urgent need in all urban areas, as the conditions under which the great bulk of the African population lives in the towns of Kenya are definitely detrimental to health.

F. J. CARLYLE JOHNSTONE,

*Acting Deputy Director of Sanitary Service.*

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#### IV.—PORT HEALTH WORK AND ADMINISTRATION.

The number of vessels which entered Kilindini or Mombasa Harbour during the past three years was as follows :—

	1928.	1929.	1930.
Steamships ...	637	687	667
Dhows ...	1,468	1,444	1,341
Total ...	2,105	2,131	2,008

Although the number of steamers calling at Mombasa during 1930 was lower than in 1929, the town is still developing and increasing in importance as a port.

During the year, four steamers arrived from India infected with smallpox, and two dhows, one from Cutch and the other from Mangalore, were also infected with the disease on arrival. The usual precautions to prevent the spread of the disease were taken, first- and second-class passengers being allowed to land under surveillance, and deck passengers proceeding to Zanzibar for quarantine.

As ships infected with smallpox were continually arriving from India, the question of protecting the Colony from this source of infection received consideration. The Governments of India and Goa were informed that immigrants from these countries would be refused admittance to Kenya unless their vaccinal condition was satisfactory. This procedure was adopted on the first of May, and since that date no further cases have occurred.

Sanitary work carried out at the port included cleansing, mosquito prevention and rat destruction in the port area and on ships. The posting of a sanitary inspector to the port enabled more efficient food inspection to be carried out. All consignments of foodstuffs arriving in the Colony were inspected, and damaged, stained or suspicious-looking cases were opened and examined thoroughly. All consignments of second-hand clothing were also submitted to inspection. The amount of second-hand clothing imported showed a 47 per cent increase over that of the previous year.

During the year it was decided to discontinue the routine examination of steamers arriving at Kisumu from Lake ports, as the value of this precaution has now been questioned for some years.

#### V.—MATERNITY AND CHILD WELFARE.

Activities in connexion with maternity and child welfare were continued during the year, but no new centres were opened. At the centres already established at Nairobi and Mombasa, attendances showed a steady increase, similar progress being reported from Eldoret. The health staff employed on this work in 1930 included two lady medical officers and five health sisters. In addition to the work performed at the larger centres, a certain amount of maternity and child welfare work was also carried out by nursing sisters attached to the various native hospitals. Home visiting in connexion with maternity and child welfare work is being carried out to an increasing extent, the general response from the African community being most encouraging.

At Mombasa, the total attendances at the five centres numbered 15,602, and 9,611 visits were paid to the homes of the people. A Baby Week was organized in connexion with the Health Exhibition held in Mombasa during the year, judging of babies and the distribution of prizes being confined to those babies who were regular attendants at the centres. The National Baby Week Council subsequently adjudged the Mombasa Show to have won the Imperial Baby Week Challenge Shield for the year.

At Nairobi, there was a total attendance of 3,822 at the centres, and 5,849 health visits were carried out.

The centres established by the Lady Grigg Child Welfare League for Asians and Africans at Nairobi and Mombasa continued to function throughout the year, being financed by Government to a large extent. At the African and Asian maternity homes in Nairobi, an increasing number of women are taking advantage of the facilities afforded. At these institutions, the training

of Indian and African midwives has also been continued. Several probationers have completed their courses, and have creditably passed examinations conducted under the supervision of the Medical Department. Government certificates have been awarded to successful candidates. In the case of Africans, those who have received certificates have been given employment in Government or mission hospitals.

## VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINICS.

The total number of patients admitted to Government hospitals or attending as out-patients showed another considerable increase in 1930 as a result of increased attendances at native hospitals.

The hospital policy for Nairobi was decided during the year. A system of separate hospitals for the different communities, and situated in the different quarters of the town, is to be brought into being. In this connexion, it is satisfactory to note that the Native Hospital is to remain at its present site in the neighbourhood of the new Laboratory.

No progress has been made with regard to the provision of hospitals for Asiatics in Nairobi or Mombasa, though it has been decided that construction is to be proceeded with as soon as funds are available. A new and satisfactory ward for Indians was built at Kisumu in the neighbourhood of the Native Hospital and near enough thereto for easy administration.

### EUROPEAN HOSPITALS.

No structural change has taken place at any of the Government European Hospitals maintained at Kisumu, Mombasa and Nairobi. At Kisumu, however, a new hospital was under construction and had approached completion at the end of the year.

The comparative table concerning in-patients treated during the past three years at Government European Hospitals is as follows :—

		1928	1929	1930
Total Number Treated ..		1,031	1,249	1,056
„ „ Discharged ..		978	1,200	998
„ „ of Deaths ..		26	23	28
„ „ Remaining ..		27	26	30

At Mombasa and Kisumu, the commonest cause of admission was malaria, but at Nairobi the first place was taken by appendicitis. At the last-mentioned hospital the usual large number of operations was performed.

The extensions to the non-Government hospitals at Nakuru and Eldoret, to which Government made considerable contributions, were completed during the year. In the case of Eldoret, the expenditure as originally proposed was largely exceeded, and an application was made to Government for a contribution greatly in excess of that which was provided in Estimates. It became evident also that the question of maintenance was likely to present difficulties which it was almost impossible to surmount under the existing administration. Suggestions were put forward, and were under consideration at the end of the year, that the hospital should be conducted in future as a combined municipal and district council activity, and that it should be partly supported from a special rate to be levied on the European residents.

### NATIVE HOSPITALS.

The building programme for native hospitals was continued throughout the year. Two entirely new hospitals at Kiambu (with 54 beds) and at Teita (with 30 beds) were completed and handed over. In both cases housing has been provided for two nursing sisters in conformity with the policy of posting nursing sisters to native hospitals, and the necessary staff was made available. The attendances which have been recorded to date are completely satisfactory.

Extensions, giving accommodation for an extra 34 beds, were completed at Kisumu, and afford relief to the congestion which has existed at that hospital for years past.

At Nakuru, a new hospital, providing accommodation for 70 beds, has replaced the old and dilapidated buildings which had existed since the early days of the Railway. An enormous improvement has been effected.

The comparative table of admissions, etc., to native hospitals in the past three years is as follows :—

	..	..	..	1928		1929		1930	
				In.	Out.	In.	Out.	In.	Out.
Patients	..	..	..	21,236	186,545	22,966	191,227	29,212	215,417
Deaths	..	..	..	1,321	..	1,283	..	1,440	..
Death-Rate per 1,000 admissions	..	..	..	62.2	..	55.8	..	49.3	..

Among the causes of admission malaria was, as usual, the most prominent. The high proportion of cases of lung disease, including pneumonia, was maintained, while syphilis, ulcers and local injuries were responsible for large numbers.

The policy to be adopted with regard to the provision of hospital facilities for employed natives remains an urgent question, which requires the earnest consideration of Government.

The new mission hospital under construction in the Coast area at the end of 1929 was completed in 1930, and is satisfactorily filling its place as an integral part of the hospitalization scheme for the country.

Government now gives financial support to six mission hospitals operating in the Colony and Protectorate, while one other existing mission hospital does not as yet receive a subsidy.

#### **INFECTIOUS DISEASES HOSPITALS.**

The Infectious Diseases Hospitals maintained at Mombasa and Nairobi continue to admit large numbers of cases.

At Mombasa 482 cases, including 9 contacts, were admitted, of which dysentery (47 cases), gonorrhoea (83 cases), tuberculosis (70 cases), and syphilis (93 cases) provided the bulk.

At Nairobi 1,208 cases, including 43 contacts, were admitted. The main causes of admission were chicken-pox (112 cases), gonorrhoea (158 cases), syphilis (274 cases), measles (79 cases), mumps (64 cases), and plague (114 cases).

#### **DISPENSARIES.**

The total number of dispensaries maintained in connexion with the various hospitals in the reserves remained unchanged during the year. Several proposals were made by Local Native Councils for the erection of new centres, for which money was to be provided from Local Native Council funds, but it has not been possible to contemplate any increase, owing to the fact that the numbers require to be strictly regulated in accordance with the amount of supervision which can be given, and the amount of money available for drugs, dressings and wages for staff. Progress is, however, being continued in the direction of replacing the old temporary and unsatisfactory buildings by permanent structures which, if satisfactory quarters for the dresser in charge are included, supply useful object lessons in the provision of better housing. Constant attention has to be paid, however, to the point that such housing as is provided is of a type which can be adopted by natives in the neighbourhood who are desirous of erecting better accommodation for themselves.

The figures given in the returns for attendances at dispensaries remain very large, but cannot be accepted as reliable, either as to numbers or diagnoses.

### VENEREAL CLINICS.

There has been no increase during the year in the number of centres. At Nairobi, four sessions for treatment of venereal disease in women are held weekly at the four maternity and child welfare centres. At Mombasa one special clinic takes place weekly at each of two of the health centres. Quite apart from the special clinics which have already been mentioned, all cases of venereal disease which are detected at the centres receive treatment. An effort is made to persuade the patients to attend at the times specially set apart, but this is in many cases fruitless and treatment has to be given at whatever times attendances are made. In effect, all the infant welfare and ante-natal clinics deal with venereal disease.

Two clinics for men are in operation at Nairobi, and four sessions are held weekly. The number of attendances remains approximately the same as in 1929.

At the Mombasa clinics, 115 new cases of syphilis and one of gonorrhoea received treatment, together with 274 cases of yaws.

At Nairobi at the female clinics 398 new cases of syphilis, two of gonorrhoea and 197 of yaws were treated, the total attendances being 2,723. Male cases at the Nairobi clinic were syphilis 269, yaws 122, and gonorrhoea 38, with a total attendance of 1,294.

## VII.—PRISONS AND ASYLUMS. PRISONS.

The general and structural conditions of the prisons of the country remained unchanged during the year, and it is sufficient to say that the position with regard to these has not been ameliorated.

The comparative figures for sickness and deaths in prisons for the past three years are :—

Year.	Daily Average in Prison.	Admissions to Hospital.	Daily Average on Sick List.	Percentage of Total Inmates.	Deaths.
1928	2,368	2,202	98	4·1	82
1929	2,328	1,671	81	3·5	83
1930	2,380	1,729	95	4·0	29

Although the figures regarding the sickness rate are rather higher than in the previous year, it will be observed that a notable reduction in the number of deaths was recorded. The reduction is largely accounted for by the considerable decrease from thirty-one to twelve in the number of cases of pneumonia.

Of the total of twenty-nine deaths, pneumonia was responsible for twelve and tuberculosis for nine.

Detailed figures concerning the three largest prisons are given below :—

	Nairobi.			Mombasa.			Kisumu.		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Average Daily Number in Gaol .. ..	830	828	913	275	221	225	295	281	296
Average Daily Number on Sick List .. ..	50	38	57	5	9	9	12	7	3
Percentage of Average Daily Sick to Average Number in Gaol .. ..	6·0	4·6	6·2	1·8	4·1	3·8	4·0	2·5	1·0
Total Deaths (Excluding Executions) .. ..	36	36	18	6	6	3	11	16	1
Percentage of Deaths to Average Daily Number in Gaol .. ..	4·3	4·3	1·9	2·2	2·7	1·3	3·7	5·7	0·3

It will be observed that although Nairobi headed the list of sickness and mortality rates, the figures in general more closely approximated than in previous years to those of the two other prisons. The large fall in the death-rate is a prominent feature.

The detailed examination for tuberculosis of the inmates of Nairobi Prison which was commenced during 1929 was concluded in the first half of 1930. The general conclusion arrived at was that although there had undoubtedly been a large increase in the number of cases returned as tuberculosis, in part at least this was probably due to better diagnosis as a result of the increased medical attention which it had been possible to provide. In spite of the general conclusion, however, the following passages in the report are significant :—

" From this one finds that the periods elapsing between admission to Prison and the appearance of the first recorded symptoms, may be grouped as follows :—

Less than 100 days	...	...	...	9 cases
Between 100 and 200 days	...	...	...	7 cases
Between 200 and 300 days	...	...	...	6 cases
Between 300 and 400 days	...	...	...	3 cases
More than 400 days	..	...	...	17 cases,

and that the average period was 321 days.

Further, the average duration of illness from first recorded symptoms to death, during the same period, was 93 days."

#### MATHARI MENTAL HOSPITAL.

The total number—thirty—of deaths which occurred during 1930 was larger than in preceding years, but of this eight were recorded in patients with less than a month's residence. No epidemics occurred. The communicable diseases to which deaths were primarily attributed were :—

Pneumonia	...	...	...	...	7
Tuberculosis	...	...	...	...	6
Dysentery	...	...	...	...	2
Meningitis	...	...	...	...	1
Trypanosomiasis	...	...	...	...	1

No new building construction was undertaken and the Indian patients still remain without separate quarters.

The comparative table for admissions, discharges and deaths for the past three years is :—

		ADMISSIONS			DISCHARGES			DEATHS		
		1928	1929	1930	1928	1929	1930	1928	1929	1930
Males	.. .. ..	83	110	111	66	75	87	15	19	30
Females	.. .. ..	28	20	33	16	16	24	8	6	4
TOTALS	.. ..	111	130	144	82	91	111	23	25	34

The total number of patients treated during the year was 278—males 206, and females 72—and the average daily number was 138.6.

The forms of mental disorder for which patients were admitted were classified as follows :—

Mania	...	...	...	...	...	...	54
Melancholia	...	...	...	...	...	...	4
Dementia	...	...	...	...	...	...	16
Delusional insanity	...	...	...	...	...	...	6
Paranoia	...	...	...	...	...	...	1
Other mental diseases	...	...	...	...	...	...	60
Epileptics	...	...	...	...	...	...	3
						Total	144

The number of patients remaining at the end of the year was 133, as against 134 at the end of 1929.

#### European Section.

The total number treated during the year was 17. The details are :—

		Males.		Females.
Remaining from 1929		... 4	...	1
Admissions	...	... 4	...	5
Discharges	...	... 4	...	2
Deaths	...	... 1	...	0
Remaining	...	... 3	...	4

The one death resulted from cirrhosis of the liver.

A practical difficulty in the care of European patients, and also of Asiatics, is that, on account of the small numbers and diversity of affections, there is little opportunity for social amusement, and individuals tend to become morbid and introspective.

#### Asiatic Section.

The total number treated during the year was 16. The figures are :—

		Males.		Females.
Remaining from 1929		... 7	...	1
Admissions	...	... 7	...	1
Discharges	...	... 10	...	0
Deaths	...	... 0	...	0
Remaining	...	... 4	...	2

#### Native Section.

The total number treated during the year was 184. The figures are :—

		Males.		Females.
Remaining from 1929		... 84	...	37
Admissions	...	... 100	...	27
Discharges	...	... 73	...	22
Deaths	...	... 29	...	4
Remaining	...	... 82	...	38

It appears that mania, senile dementia and dementia praecox, in that order, are the three commonest conditions for which natives are admitted to the Mental Hospital.

## VIII.—METEOROLOGY.

The statistics supplied by the Director of the British East African Meteorological Service are contained in Table IV appended to this Report.

JOHN L. GILKS,  
*Director of Medical and Sanitary Services.*

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## RETURNS.

## TABLE I.

## Administrative Division.

Dr. J. L. GILKS .. .. ..	Director of Medical and Sanitary Services.
„ A. D. J. B. WILLIAMS, O.B.E. ..	Deputy Director of Medical Service.
„ A. R. PATERSON .. .. ..	Deputy Director of Sanitary Service.
„ P. F. NUNAN .. .. ..	Senior Medical Officer.
„ F. J. C. JOHNSTONE .. .. ..	Senior Health Officer.
Mr. A. P. LING .. .. ..	Chief Sanitary Inspector.
(1) Capt. J. S. ROBERTSON, M.B.E. ..	Medical Storekeeper.
Mr. H. OGDEN .. .. ..	Office Superintendent.
„ G. E. SCATTERGOOD .. .. ..	Accountant.
„ H. ELLIOTT, M.B.E. .. .. ..	Medical Storekeeper.
„ T. R. WILSON .. .. ..	Clerk.
„ A. E. W. WEBB .. .. ..	„ „ „
„ R. L. O'SHEA .. .. ..	„ „ „
Mrs. E. L. FEAST .. .. ..	„ „ „
Mr. J. W. SHEARMAN .. .. ..	„ „ „
Miss M. E. CAMERON .. .. ..	„ „ „
„ M. A. CORFE .. .. ..	„ „ „
„ T. M. RAPER .. .. ..	„ „ „
„ J. M. C. MILLETT .. .. ..	„ „ „
„ K. L. GRANT .. .. ..	„ „ „
Mrs. G. E. FREISLICH .. .. ..	„ „ „
Miss J. WEBSTER .. .. ..	„ „ „
„ L. E. SHELTON .. .. ..	„ „ „
„ E. C. GANNON .. .. ..	„ „ „
„ J. M. GILBERT .. .. ..	„ „ „

## Medical Division.

Dr. N. P. JEWELL, O.B.E., M.C. .. ..	Resident Surgical Officer
„ T. H. MASSEY, M.C. .. ..	Senior Medical Officer.
„ V. M. FISHER .. .. ..	„ „ „
„ D. S. SCOTT .. .. ..	„ „ „
„ C. B. B. REID .. .. ..	„ „ „
„ J. H. NEILL .. .. ..	„ „ „
„ R. C. BRISCOE .. .. ..	Medical Officer.
„ C. V. BRAIMBRIDGE .. .. ..	„ „ „
„ K. T. K. WALLINGTON .. .. ..	„ „ „
„ R. A. W. PROCTER, M.C. .. ..	„ „ „
„ R. J. HARLEY-MASON .. .. ..	„ „ „
„ J. C. J. CALLANAN .. .. ..	„ „ „
„ C. H. BRENNAN .. .. ..	„ „ „
„ P. MILNE .. .. ..	„ „ „
„ F. R. L. MILLER .. .. ..	„ „ „
„ E. W. C. JOBSON .. .. ..	„ „ „
„ A. R. ESLER .. .. ..	„ „ „
„ A. J. ENZER .. .. ..	„ „ „
„ C. R. PHILIP .. .. ..	„ „ „
„ W. WILKINSON .. .. ..	„ „ „
„ J. R. DAVIES .. .. ..	„ „ „
„ A. G. THOMSON .. .. ..	„ „ „
„ J. A. CARMAN .. .. ..	„ „ „
„ D. BELL .. .. ..	„ „ „
„ J. H. H. CHATAWAY .. .. ..	„ „ „
(2) „ H. A. COLE .. .. ..	„ „ „
„ R. MCFIGGANS .. .. ..	„ „ „

(1) Retired on pension, 19th October, 1930.

(2) Resigned, 25th February, 1930.

## Medical Division.—(Contd.)

Dr.	P. ROSS	..	..	..	Medical Officer.
„	N. MCLEAN	..	..	..	„ „
„	G. S. HALE	..	..	..	„ „
„	A. T. HOWELL	..	..	..	„ „
„	W. A. BULLEN	..	..	..	„ „
„	E. A. TRIM	..	..	..	„ „
(1)	„ W. L. PATERSON	..	..	..	„ „
„	T. F. ANDERSON	..	..	..	„ „
„	J. D. S. THOMAS	..	..	..	„ „
„	C. S. DAVIES	..	..	..	„ „
„	G. D. DRURY	..	..	..	„ „
„	J. W. BOWDEN	..	..	..	„ „
„	P. G. PRESTON	..	..	..	„ „
„	M. A. W. ROBERTS	..	..	..	„ „
„	H. A. McMILLAN	..	..	..	„ „
„	J. C. D. CAROTHERS	..	..	..	„ „
„	H. C. TROWELL	..	..	..	„ „
„	A. B. SWARBRECK	..	..	..	„ „
„	M. S. R. BROADBENT	..	..	..	„ „
„	H. N. TURNER	..	..	..	„ „
„	J. D. ROBERTSON	..	..	..	„ „
„	R. M. DOWDESWELL	..	..	..	„ „
„	E. C. W. MAXWELL	..	..	..	„ „
„	F. L. HENDERSON	..	..	..	District Surgeon.
„	J. FORBES	..	..	..	„ „
„	C. J. CADDICK	..	..	..	„ „
„	C. E. COWEN	..	..	..	„ „
Mr.	H. L. SARGENT	..	..	..	Assistant Surgeon.
„	W. N. SARGENT	..	..	..	„ „
„	L. LONG	..	..	..	Chief Instructor.
(2)	„ A. H. BALL	..	..	..	Dispenser.
„	F. E. WELCH	..	..	..	„ „
„	W. C. A. SKEDGE	..	..	..	„ „
„	H. THEOBALD	..	..	..	„ „
„	J. C. GOWER	..	..	..	„ „
(3)	„ A. LOWE	..	..	..	Wardmaster.
„	G. D. SHEEL	..	..	..	„ „
„	F. G. VIE	..	..	..	„ „
„	T. JOHNSTON	..	..	..	Nursing Orderly
„	F. GALLOWAY	..	..	..	„ „
Miss	I. WILSON	..	..	..	Matron.
(4)	„ A. E. DAVIS	..	..	..	Nursing Sister.
„	M. I. RHIND	..	..	..	„ „
„	R. ANDERSON	..	..	..	„ „
„	D. M. KENNY	..	..	..	„ „
„	F. M. BIGGAR	..	..	..	„ „
„	A. K. WILSON	..	..	..	„ „
„	C. E. EASON	..	..	..	„ „
„	E. M. BIRCH	..	..	..	„ „
„	M. E. ROCHE	..	..	..	„ „
„	S. I. BEAZLEY	..	..	..	„ „
„	I. M. NICOLSON	..	..	..	„ „
„	M. S. NEVILLE	..	..	..	„ „
„	M. MCLEOD	..	..	..	..
(5)	„ S. JOHNSON	..	..	..	„ „
(6)	„ A. M. PEARTON	..	..	..	„ „

(1) Resigned, 25th December, 1930.

(2) Services terminated, 14th May, 1930.

(3) Services terminated, 6th June, 1930.

(4) Transferred to Zanzibar, 1st October, 1930.

(5) Retired, 13th April, 1930.

(6) Transferred to West Africa, 8th May, 1930.

## Medical Division.—(Contd.)

	Miss M. E. E. CLELLAND .. ..	Nursing Sister.
(1)	„ M. E. F. CHAMBERS .. ..	„ „ „
	„ V. M. MORDAUNT .. ..	„ „ „
	„ R. M. HOOK .. ..	„ „ „
	„ H. M. COCHRANE .. ..	„ „ „
	„ M. D. KENNEDY .. ..	„ „ „
	„ M. A. MARSHALLI .. ..	„ „ „
	„ A. M. THOM .. ..	„ „ „
	„ R. F. McLACHLAN .. ..	„ „ „
	„ F. E. JACKSON .. ..	„ „ „
	„ M. V. TODRICK .. ..	„ „ „
	„ D. L. BARTLETT .. ..	„ „ „
	„ M. E. BENNET .. ..	„ „ „
	„ G. EVANS .. ..	„ „ „
	„ D. V. GLANVILLE .. ..	„ „ „
	„ M. POWLES .. ..	„ „ „
	„ R. WALPOLE .. ..	„ „ „
	„ R. M. REID .. ..	„ „ „
	„ B. J. MAC MANUS .. ..	„ „ „
	„ M. G. ALLEN .. ..	„ „ „
	„ J. SCOTT .. ..	„ „ „
	„ E. McNAB .. ..	„ „ „
	„ G. M. HENERY .. ..	„ „ „
	„ E. SEATON .. ..	„ „ „
	„ D. A. PORTER .. ..	„ „ „
	„ F. M. BABBAGE .. ..	„ „ „
	„ G. E. HAYES .. ..	„ „ „
	„ L. I. M. HOLMES .. ..	„ „ „
	„ K. R. JARDINE .. ..	„ „ „
	„ D. E. ROBINSON .. ..	„ „ „
	„ A. MACDONALD .. ..	„ „ „
	„ M. I. SMART .. ..	„ „ „
	Mr. W. G. HOWE .. ..	Superintendent, Mathari Mental Hospital.
	Mrs. A. T. HOWE .. ..	Matron, Mathari Mental Hospital.
	Mr. S. J. BOSCH .. ..	Warder, Mathari Mental Hospital.
	Mrs. M. A. BOSCH .. ..	Asst. Matron, Mathari Mental Hospital.
	Mr. F. M. SMURTHWAITE .. ..	Warder, Mathari Mental Hospital.

## Sanitation Division.

	Dr. H. S. DE BOER, M.C. .. ..	Senior Health Officer.
	„ R. N. HUNTER .. ..	„ „ „
(2)	„ J. MCP. CAMPBELL .. ..	Health Officer.
	„ P. C. C. GARNHAM .. ..	„ „ „
	„ K. A. T. MARTIN .. ..	„ „ „
	„ P. P. D. CONNOLLY .. ..	„ „ „
(3)	„ N. MACLENNAN .. ..	„ „ „
	„ R. F. G. DICKSON .. ..	„ „ „
	„ G. M. HARGREAVES .. ..	„ „ „
	„ M. MICHAEL SHAW (MRS.) .. ..	„ „ „
	„ C. N. TWINING (MISS) .. ..	„ „ „
	„ A. J. W. WILKINS .. ..	„ „ „
	„ I. M. D. GRIEVE .. ..	„ „ „
	Mr. J. P. COOK .. ..	Senior Sanitary Inspector.
	„ A. BUNKER .. ..	„ „ „
	„ D. P. BROAD .. ..	Sanitary Inspector.
	„ R. C. MILLS .. ..	„ „ „
	„ H. E. TAYLOR .. ..	„ „ „
	„ F. HEWITT .. ..	„ „ „

(1) Resigned, 19th June, 1930.

(2) Transferred to Tanganyika Territory, 5th November, 1930.

(3) Transferred to Palestine, 27th June, 1930.

**Sanitation Division.—(Contd.)**

Mr. H. O. SALT .. .. ..	.. Sanitary Inspector.
„ A. C. ARNOLD .. .. ..	.. „ „
„ H. MARTIN .. .. ..	.. „ „
„ H. H. RODGERS .. .. ..	.. „ „
„ D. MACKINTOSH .. .. ..	.. „ „
„ C. A. LEWIS .. .. ..	.. „ „
„ T. HUGHES .. .. ..	.. „ „
„ F. FRANKS .. .. ..	.. „ „
„ R. D. PEARSON .. .. ..	.. „ „
„ F. C. GAFFNEY .. .. ..	.. „ „
„ G. F. NEWBURY .. .. ..	.. „ „
„ H. JORDAN .. .. ..	.. „ „
„ J. S. STIRTON .. .. ..	.. „ „
(1) „ F. E. WEAVER .. .. ..	.. „ „
(2) „ A. ANDERSON .. .. ..	.. „ „
„ G. E. SHAW .. .. ..	.. Sanitary Overseer.
„ H. COCK .. .. ..	.. „ „
(3) „ J. P. KELLY .. .. ..	.. „ „
(4) „ A. P. REEVE, M.C. .. .. ..	.. „ „
(5) „ R. FRANKLIN .. .. ..	.. „ „
Miss R. K. SHARP .. .. ..	Nursing Sister.
(6) „ E. A. M. RIORDAN .. .. ..	.. „ „
„ M. G. RICE-OXLEY .. .. ..	.. „ „
„ M. A. PERKIN .. .. ..	.. „ „
„ G. A. DONEGAN .. .. ..	.. „ „
„ A. M. BURNS .. .. ..	.. „ „
„ G. C. HAWKINS .. .. ..	.. „ „
„ G. M. WARRINGTON .. .. ..	.. „ „
„ C. M. SUMMERFIELD .. .. ..	.. „ „
Mr. W. J. HENFREY .. .. ..	.. Superintendent, Infectious Diseases Hospital.

**Laboratory Division.**

Dr. W. H. KAUNTZE, M.B.E. .. ..	.. Deputy Director of Laboratory Services
„ R. P. CORMACK .. ..	.. Senior Bacteriologist.
„ F. P. G. DE SMIDT .. ..	.. Assistant Bacteriologist.
„ H. D. TONKING .. ..	.. „ „
„ F. W. VINT .. ..	.. „ „
Mr. M. H. FOX .. ..	.. Government Analyst.
Dr. D. HARVEY .. ..	.. Chemical Officer.
Mr. C. B. SYMES .. ..	.. Entomologist.
„ J. I. ROBERTS .. ..	.. „
„ F. A. BAILEY .. ..	.. Laboratory Superintendent
(7) „ J. A. BELL .. ..	.. „ Assistant.
„ H. M. NEFDT .. ..	.. „ „
„ A. H. DAWS .. ..	.. „ „
„ J. McMAHON .. ..	.. „ „
„ W. L. TITMAN .. ..	.. „ „
„ W. A. DOUST .. ..	.. „ „
„ E. C. YOUNG .. ..	.. „ „
„ C. E. J. LAMPERD .. ..	.. „ „
„ E. W. GRAINGER .. ..	.. „ (Learner Grade).
„ T. JONES .. ..	.. „ „ „
„ L. BURTON .. ..	.. „ „ „
(8) „ S. MOORE .. ..	.. „ „ „

(1) Transferred to Nyassaland, 8th October, 1930.

(2) Transferred to Kenya and Uganda Railways and Harbours, 15th Dec., 1930.

(3) Resigned, 6th June, 1930.

(4) Resigned, 31st August, 1930.

(5) Services terminated, 30th June, 1930.

(6) Resigned, 12th January, 1930.

(7) Resigned, 1st September, 1930.

(8) Resigned, 30th April, 1930.

**TABLE II.**  
**Financial.**

The sanctioned medical budget for the year 1930 was a total of £257,415, as compared with £248,561 for the preceding twelve months.

Of the 1930 grand total, £241,766 was expended, leaving an unexpended sum of £15,649.

The headings under which the vote was arranged were as follows :—

ADMINISTRATIVE DIVISION.			
	Estimates.	Actual Expenditure.	
Personal Emoluments	... £20,139	... £19,232	
MEDICAL DIVISION.			
Personal Emoluments	... £89,320	... £85,574	
SANITATION DIVISION.			
Personal Emoluments	... £29,674	... £27,858	
LABORATORY DIVISION.			
Personal Emoluments	... £16,385	... £15,223	
MEDICAL DEPARTMENT.			
Other Charges	... £101,897	... £93,879	
		+1566	

The total amount of revenue collected was as follows :—

Hospital fees	... ... ... ...	£7,760	
Bills of health	... .. ... ...	727	
Laboratory fees	... ... ... ...	878	
Registration fees	... ... ... ...	89	
Sale of medicines, etc.	... ... ... ...	969	
		————— £10,423	
Reimbursement from Uganda Government on account of Zanzibar Sanitary Station	... ... ... ...	425	
Reimbursement from Kenya and Uganda Railways and Harbours on account of—			
(a) Medical Services	... ... ...	11,915	
(b) Dental Services	... ... ...	461	
Reimbursement from Nairobi Municipality on account of Public Health staff		2,907	
Reimbursement from Mombasa Municipality on account of Public Health staff		4,125	
Reimbursement on account of messing expenses, European Hospital, Nairobi		603	
		————— £20,436	
		————— £30,859	

Last year the total revenue collected amounted to £34,325.

**TABLE III.**  
**Return of Statistics of Population for the Year 1930.**

COLONY AND PROTECTORATE OF KENYA	Europeans and Whites	Africans and Others	Asiatics
Number of Inhabitants in 1929 .. ..	*12,529	+2,515,330	*26,759
Number of Births Registered in 1930 .. ..	339	Figures not available	Figures not available
Number of Deaths Registered in 1930 .. ..	80	do.	do.
Number of Immigrants during 1930 .. ..	6,141	1,561	12,093
Number of Emigrants during 1930 .. ..	5,965	1,338	11,987
Number of Inhabitants during 1930 .. ..	*12,529	+2,930,654	*26,759

\* 1926 Census.

+ Estimated at 31-12-1929.

TABLE IV.

## METEOROLOGICAL RETURNS FOR THE YEAR 1930.

MONTH.	TEMPERATURE					RAINFALL	WINDS	REMARKS		
	Solar Maximum.	Maximum on Grass	Shade Maximum.	Range.	Max. and Min. mean combined.	Shade Minimum.	Amount in Inches.	Degree of Humid- ity.	General Direction.	Average Force 1-10.
<b>SCOTT AGRICULTURAL LABORATORY—KABETE</b>										
January .. ..	77·0	22·8	65·6	54·2	5·88	67				
February .. ..	76·0	19·7	66·1	56·3	2·37	73				
March .. ..	74·7	17·2	66·1	57·5	11·36	74				
April .. ..	74·0	17·0	65·5	57·0	19·42	81				
May .. ..	72·0	15·8	64·1	56·2	15·48	79				
June .. ..	69·6	17·0	61·1	52·6	0·70	81				
July .. ..	69·8	18·8	60·4	51·0	0·08	77				
August .. ..	71·0	20·4	60·8	50·6	0·58	76				
September .. ..	76·3	22·3	65·1	54·0	3·33	74				
October .. ..	75·2	21·0	64·7	54·2	4·19	73				
November .. ..	72·2	15·0	64·7	57·2	7·23	87				
December .. ..	73·4	18·1	64·3	55·3	1·38	76				
Total .. ..					72·00					
YEAR AVERAGE ..	73·4	18·7	64·0	54·7	34·27	76				
<b>NAIROBI :</b>										
January .. ..						5·06				
February .. ..						3·67				
March .. ..						7·69				
April .. ..						13·43				
May .. ..						11·96				
June .. ..						0·74				
July .. ..			No records available			0·22				
August .. ..						0·76				
September .. ..						4·59				
October .. ..						4·51				
November .. ..						7·38				
December .. ..						1·79				
(Average) .. ..						34·95				
YEAR TOTAL ..						61·80				
<b>KISUMU :</b>										
January .. ..						4·79				
February .. ..						2·33				
March .. ..						5·62				
April .. ..						11·49				
May .. ..						8·79				
June .. ..						1·60				
July .. ..			No records available			1·92				
August .. ..						1·02				
September .. ..						4·46				
October .. ..						4·27				
November .. ..						0·83				
December .. ..						1·66				
(Average) .. ..						44·71				
YEAR TOTAL ..						48·78				

## METEOROLOGICAL RETURN—Contd.

MONTH	TEMPERATURE					RAINFALL	WINDS	REMARKS
	Solar Maximum	Minimum on Grass	Shade Maximum	Range	Max. and Min. mean combined			
<b>MOMBASA :</b>								
January .. ..	88·7	12·8	82·3	75·9	3·18			
February .. ..	88·3	11·6	82·5	76·7	1·81			
March .. ..	87·3	11·3	81·7	76·0	6·79			
April .. ..	86·8	10·4	81·6	76·4	6·53			
May .. ..	85·0	9·3	80·3	75·7	2·66			
June .. ..	83·8	10·7	78·5	73·1	0·84			
July .. ..	82·6	10·4	76·9	71·2	1·26			
August .. ..	82·3	10·1	77·3	72·2	2·65			
September .. ..	84·5	10·6	79·2	73·9	1·49			
October .. ..	85·8	10·3	80·7	75·5	6·02			
November .. ..	86·7	9·8	81·8	76·9	3·60			
December .. ..	88·2	10·9	82·7	77·3	2·70			
YEAR AVERAGE ..	85·8	10·7	80·5	75·1	46·61			
Total .. ..					39·53			
<b>FORT HALL :</b>								
January .. ..					0·68			
February .. ..					1·68			
March .. ..					7·41			
April .. ..					13·88			
May .. ..					5·38			
June .. ..			No records available		1·34			
July .. ..					0·09			
August .. ..					1·17			
September .. ..					3·71			
October .. ..					8·14			
November .. ..					10·12			
December .. ..					4·38			
YEAR AVERAGE ..					45·12			
Total .. ..					57·98			

TABLE SHOWING MEAN ANNUAL RAINFALL AT VARIOUS POINTS IN THE DIFFERENT AREAS FOR THE YEAR 1930.

COAST AREA.		MOUNTAINOUS AREA—(Contd.).	
STATION.	TOTAL 1930.	STATION	TOTAL 1930
Malindi .. ..	29·35 inches	Naivasha .. ..	46·76 inches
Mombasa .. ..	43·15 "	Nakuru .. ..	50·89 "
Mazeras .. ..	24·46 "	Molo .. ..	59·36 "
Mackinnon Road .. ..	52·31 "	Eldama Ravine .. ..	54·16 "
Voi .. ..	27·78 "		
Taveta .. ..	28·80 "		
MOUNTAINOUS AREA.		NYANZA AND KENYA PROVINCE.	
Masongaleni .. ..	40·35 inches	Lumbwa .. ..	53·63 inches
Makindu .. ..	39·64 "	Muhuroni .. ..	73·04 "
Athi River .. ..	41·63 "	Kisumu .. ..	48·78 "
Kiu .. ..	49·94 "	Mumias (Kakamega) .. ..	80·20 "
Nairobi (Department of Agriculture) .. ..	61·80 "	Kericho .. ..	80·47 "
Kabete Reformatory .. ..	61·57 "	Nandi (Kapsabet) .. ..	67·87 "
		Fort Hall .. ..	57·98 "
		Nyeri .. ..	43·06 "
		West Kenya—Records incomplete.	

**RETURN OF DISEASES (In-Patients)**  
*For the Year 1930*

EUROPEAN OFFICIALS		EUROPEAN GENERAL POPULATION (NON-OFFICIAL)		NON-EUROPEAN OFFICIALS (including ASIATICS)		NATIVE GENERAL POPULATION (including ASIATICS)	
DISEASES	Total Admissions	Total Deaths	Total Cases Treated	Total Admissions	Total Deaths	Total Cases Treated	Total Admissions
(a) Typhoid Fever	3	..	..	9	1	9	5
(b) Paratyphoid A.	2	..	..	..	..	..	..
(c) Paratyphoid B.	1	..	..	..	..	..	..
(d) Type not defined	1	..	..	3	1	1	2
2. Typhus	12	..	..	10	3	..	..
3. Relapsing Fever	..	..	..	..	..	..	..
4. Undulant Fever	..	..	..	..	..	..	..
5. Malaria—Cerebral	..	..	..	32	1	18	2
(a) Tertian	..	..	..	..	1	..	..
(b) Quartan	..	..	..	4	..	13	..
(c) Aestivo-autumnal	..	..	..	94	4	109	2
(d) Undifferentiated	..	..	..	195	1	107	2
(e) Cachexia	..	..	..	3	..	..	..
(f) Blackwater	..	..	..	6	1	..	..
(g) Cerebral	..	..	..	..	..	..	..
6. Smallpox	..	..	..	..	..	..	..
Alastrim	..	..	..	..	..	..	..
7. Measles	..	..	..	..	..	..	..
8. Scarlet Fever	..	..	..	1	..	..	..
9. Whooping Cough	..	..	..	1	..	..	..
10. Diphtheria..	..	..	..	1	..	..	..
11. Influenza	..	..	..	1	..	..	..
12. Military Fever	..	..	..	267	6	..	..
13. Mumps	..	..	..	..	1	..	..
14. Cholera	..	..	..	..	..	..	..
15. Epidemic Diarrhoea	..	..	..	..	..	..	..
16. Dysentery—	..	..	..	..	..	..	..
(a) Amoebic	..	..	..	1	4	..	..
(b) Bacillary	..	..	..	1	1	..	..
(c) Undefined or due to other causes ..	..	..	..	13	..	13	..
				38	..	..	..
				23	..	..	..
				2	..	..	..
				23	..	..	..
				13	..	13	..
				253	21	..	..
				266	8	..	..

RETURN OF DISEASES—IN-PATIENTS—(Contd.).

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RETURN OF DISEASES—IN-PATIENTS—(Contd.).

**RETURN OF DISEASES—IN-PATIENTS—(Contd.).**

DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			NON-EUROPEAN OFFICIALS (including ASIATICS)			NATIVE GENERAL POPULATION (including ASIATICS)		
	Total Admision	Total Deaths	Total Cases Treated	Total Admision	Total Deaths	Total Cases Treated	Total Admision	Total Deaths	Total Cases Treated	Total Admision	Total Deaths	Total Cases Treated
II.—GENERAL DISEASES NOT MENTIONED ABOVE—(Contd.).												
45. Cancer or other Malignant Tu- mours of the Peritoneum In- testines, Rectum . . . . .	..	..	..	1	..	1	1	..	1	6	4	6
46. Cancer or other Malignant Tu- mours of the Female Genital Organs . . . . .	..	1	..	..	..	..	..	..	..	3	..	..
47. Cancer or other Malignant Tu- mours of the Breast . . . . .	..	..	..	1	..	1	..	..	..	7	2	7
48. Cancer or other Malignant Tu- mours of the Skin . . . . .	..	..	..	..	..	..	..	..	..	9	9	2
49. Cancer or other Malignant Tu- mours of Organs not specified . . . . .	..	..	..	..	..	..	..	..	..	1	29	5
50. Tumours, Non-malignant . . . . .	..	..	..	..	..	..	..	..	..	4	163	8
51. Acute Rheumatism . . . . .	..	..	..	2	..	2	2	..	5	..	30	3
52. Chronic Rheumatism . . . . .	..	..	..	3	..	3	6	..	..	2	67	1
53. Scurvy (including Barlow's Dis- ease) . . . . .	..	..	..	3	..	3	11	..	1	..	58	4
54. Pellagra . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
55. Beri-beri . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
56. Rickets . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
57. Diabetes (not including Insipidus) Anæmia—	..	..	..	..	..	..	..	..	..	..	..	..
(a) Pernicious . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
(b) Other Anæmias and Chlor- osis . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
59. Diseases of the Pituitary Body . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
60. Diseases of the Thyroid Gland—	..	..	..	..	..	..	..	..	..	..	..	..
(a) Exophthalmic Goitre . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
(b) Other Diseases of the Thy- roid Gland, Myxoedema . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
61. Diseases of the Para-thyroid Glands . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
62. Diseases of the Thymus . . . . .	..	..	..	..	..	..	..	..	..	..	..	..

RETURN OF DISEASES—IN-PATIENTS—(Contd.).

RETURN OF DISEASES—IN-PATIENTS—(Contd.).

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EUROPEAN OFFICIALS		NON-EUROPEAN OFFICIALS (including Asiatics)		NATIVE GENERAL POPULATION (including Asiatics)	
DISEASES	Cases remaining in Hospital at end of year	Total Admin- stration	Total Deaths in Hospital previous year	Total Admin- stration	Total Deaths in Hospital previous year
	Cases remaining from previous year	Total Cases Treated	Total Deaths	Total Cases Treated	Total Deaths
III.—AFFECTIONS OF THE NERVOUS SYSTEM AND ORGANS OF THE SENSES—(Contd.).					
75. Paralysis—					
(a) Hemiplegia ..	..	..	..	..	..
(b) Other Paralyses ..	..	..	..	..	..
76. General Paralysis of the Insane ..	..	..	..	..	..
78. Other forms of Mental Alienation ..	..	..	..	..	..
78. Epilepsy ..	..	..	..	..	..
79. Eclampsia Convulsions (non-puerperal) 5 years or over ..	..	..	..	..	..
80. Infantile Convulsions ..	..	..	..	..	..
81. Chorœa ..	..	..	..	..	..
82. A.—Neuralgia ..	..	..	..	..	..
B.—Neuritis ..	..	..	..	..	..
C.—Neurasthenia ..	..	..	..	..	..
83. Cerebral Softening ..	..	..	..	..	..
84. Other affections of the Nervous System, such as Paralysis Agitans ..	..	..	..	..	..
85. Affections of the Organs of Vision ..	..	..	..	..	..
(a) Conjunctivitis ..	..	..	..	..	..
(b) Trachoma ..	..	..	..	..	..
(c) Tumours of the Eye ..	..	..	..	..	..
(d) Other affections of the Eye ..	..	..	..	..	..
86. Affections of the Ear or Mastoid Sinus ..	..	..	..	..	..
Other Diseases—Nose ..	..	..	..	..	..
IV.—AFFECTIONS OF THE CIRCULATORY SYSTEM.					
87. Pericarditis ..	..	..	..	..	..
88. Acute Endocarditis or Myocarditis ..	..	..	..	..	..
89. Angina Pectoris ..	..	..	..	..	..

RETURN OF DISEASES-IN-PATIENTS—(Contd.).

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RETURN OF DISEASES—IN-PATIENTS—(Contd.)

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## RETURN OF DISEASES—IN-PATIENTS—(Contd.).

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**RETURN OF DISEASES—IN-PATIENTS—(Contd.).**

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**RETURN OF DISEASES—IN-PATIENTS—(Contd.).**

DISEASES	EUROPEAN OFFICIALS				EUROPEAN GENERAL POPULATION (Non-Official)				NON-EUROPEAN OFFICIALS (including ASIATICS)				NATIVE GENERAL POPULATION (including ASIATICS)				
	Total Admision	Total Deaths	Total Cases Treated	Cases remaining in Hospital at end of year	Cases remaining from previous year in Hospital at end of year	Total Admision	Total Deaths	Total Cases Treated	Cases remaining from previous year in Hospital at end of year	Total Admision	Total Deaths	Total Cases Treated	Cases remaining from previous year in Hospital at end of year	Total Admision	Total Deaths	Total Cases Treated	Cases remaining from previous year in Hospital at end of year
<b>VII.—DISEASES OF THE GENITO-URINARY SYSTEM (NON-VENEREAL)</b> —(Contd.).																	
134. Diseases of the Urethra—	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(a) Stricture ..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(b) Other ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
135. Diseases of the Prostate—	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hypertrophy ..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Prostatitis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
136. Diseases (Non-venerual) of the Genital Organs of Man ..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epididymitis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Orchitis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hydrocele ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ulcer of Penis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Paraphymosis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
137. Cysts or other Non-malignant Tumours of the Ovaries ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
138. Salpingitis—	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Abscess of the Pelvis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
139. Uterine Tumours (Non-malignant) ..	..	..	2	..	..	2	..	..	..	..	..	..	..	..	..	..	..
140. Uterine Haemorrhage (Non-puerperal) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
141. A.—Metritis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
B.—Other affections of the Female Genital Organs ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Displacement of Uterus ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Amenorrhœa ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Leucorrhœa ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dysmenorrhœa ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ovaritis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
142. Diseases of the Breast (Non-puerperal)—	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mastitis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Abscess of Breast ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Vulvo Vaginitis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

**RETURN OF DISEASES—IN-PATIENTS—(Contd.).**

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DISEASES	EUROPEAN OFFICIALS				EUROPEAN GENERAL POPULATION (NON-OFFICIAL)				NON-EUROPEAN OFFICIALS (including Asiatics)				NATIVE GENERAL POPULATION (including Asiatics)			
	Total Admis- sion	Total Deaths	Total Cases Treated	Total Cases Treated	Total Admis- sion	Total Deaths	Total Cases Treated	Total Cases Treated	Total Admis- sion	Total Deaths	Total Cases Treated	Total Cases Treated	Total Admis- sion	Total Deaths	Total Cases Treated	
VIII.—PUERPERAL STATE.																
143. <i>A.</i> —Normal Labour .. ..	..	..	..	..	14	..	3	..	..	..	..	..	..	..	..	..
<i>B.</i> —Accidents of Pregnancy— ..	..	..	..	..	..	..	13	..	..	..	..	..	..	..	..	..
(a) Abortion .. ..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
(b) Ectopic Gestation .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(c) Other accidents of Pregnancy .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
144. Puerperal Haemorrhage .. ..	..	..	..	..	..	..	12	..	..	..	..	..	..	..	..	..
145. Other accidents of Parturition .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
146. Puerperal Septicaemia .. ..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..
147. Phlegmasia Dolens .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
148. Puerperal Eclampsia .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
149. Sequelæ of Labour .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
150. Puerperal affections of the Breast .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
IX.—AFFECTIONS OF THE SKIN AND CELLULAR TISSUES.																
151. Gangrene .. ..	..	..	..	..	..	..	11	..	..	..	..	..	..	..	..	..
152. Boil .. ..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..
Carbuncle .. ..	..	..	..	..	..	..	23	..	..	..	..	..	..	..	..	..
153. Abscess .. ..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..
Whitlow .. ..	..	..	..	..	..	..	10	..	..	..	..	..	..	..	..	..
Cellulitis .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
154. <i>A.</i> —Tinea .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>B.</i> —Scabies .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
155. Other Diseases of the Skin— ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Erythema .. ..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..
Urticaria .. ..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Eczema .. ..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..
Herpes .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Psoriasis .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Elephantiasis .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Myiasis .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chigoes .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cutaneous Leishmaniasis .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sebaceous Cyst .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ulcers .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Other Diseases—Skin .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Filariasis .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

## RETURN OF DISEASES—IN-PATIENTS—(Contd.).

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RETURN OF DISEASES-IN-PATIENTS—(Contd.).

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EUROPEAN OFFICIALS		EUROPEAN GENERAL POPULATION (NON-OFFICIAL)		NON-EUROPEAN OFFICIALS (including Asiatics)		NATIVE GENERAL POPULATION (including Asiatics)	
DISEASES	Cases remaining in Hospital from previous year	Total Deaths	Total Cases Treated	Total Admis-sion	Total Deaths	Total Cases Treated	Total Admis-sion
165. Suicide by Poisoning .....	..	..	..	..	1	1	..
166. Corrosive Poisoning (intentional) .....	..	..	..	..	2	2	..
167. Suicide by Gas Poisoning .....	..	..	..	..	..	..	..
168. Suicide by Hanging or Stran-gulation .....	..	..	..	..	..	..	..
169. Suicide by Drowning .....	..	..	..	..	..	..	..
170. Suicide by Firearms .....	..	..	..	..	..	..	..
171. Suicide by Cutting or Stabbing Instruments .....	..	..	..	..	..	..	..
172. Suicide by jumping from a height .....	..	..	..	..	..	..	..
173. Suicide by Crushing .....	..	..	..	..	..	..	..
174. Other Suicides .....	..	..	..	..	..	..	..
175. Food Poisoning .....	..	..	..	4	..	..	..
176. Attacks of Poisonous Animals .....	..	..	..	..	13	..	..
Snake Bite .....	..	..	..	..	..	1	..
Insect Bite .....	..	..	..	..	2	..	..
177. Other Accidental Poisonings .....	..	..	..	..	1	..	..
178. Burns (by Fire) .....	..	..	..	..	2	..	..
179. Burns (other than by Fire) .....	..	..	..	..	1	..	..
180. Suffocation (Accidental) .....	..	..	..	..	2	..	..
181. Poisoning by Gas (Accidental) .....	..	..	..	..	1	..	..
182. Drowning (Accidental) .....	..	..	..	..	4	..	..
183. Wounds (by Firearms, War excepted) .....	..	..	..	..	4	..	..
184. Wounds (by Cutting or Stabbing Instruments) .....	..	..	..	..	1	..	..
185. Wounds (by Fall) .....	..	..	..	..	6	..	..
186. Wounds (in Mines or Quarries) .....	..	..	..	..	1	..	..

RETURN OF DISEASES—IN-PATIENTS—(Contd.).

DISEASES	EUROPEAN OFFICIALS				EUROPEAN GENERAL POPULATION (NON-OFFICIAL)				NON-EUROPEAN OFFICIALS (including ASIATICS)				NATIVE GENERAL POPULATION (including ASIATICS)				
	Total Admin- istration	Total Deaths	Total Cases Treated	Remain- ing in Hospital at end of year	Cases remaining in Hospital from previous year	Total Admin- istration	Total Deaths	Total Cases Treated	Remain- ing in Hospital at end of year	Cases remaining in Hospital from previous year	Total Admin- istration	Total Deaths	Total Cases Treated	Remain- ing in Hospital at end of year	Cases remaining in Hospital from previous year		
<b>XIV.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES—(Contd.).</b>																	
187. Wounds (by Machinery) ..	..	..	..	..	..	1	..	1	26	..	27	..	13	264	1	277	7
188. Wounds (Crushing, <i>e.g.</i> , Rail-way Accidents, etc.) ..	2	..	2	..	..	..	..	..	2	..	2	..	1	34	7	35	3
189. Injuries inflicted by Animals, Bites, Kicks, etc. ..	3	..	3	..	..	2	..	2	..	..	6	..	6	14	12	544	39
190. Wounds inflicted on Active Service ..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..
191. Executions of Civilians by Beligenters ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
192. <i>A.</i> —Over Fatigue ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>B.</i> —Hunger or Thirst ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
193. Exposure to Cold, Frostbite, etc. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
194. Exposure to Heat ..	..	..	..	..	..	5	..	5	..	..	2	..	2	..	..	..	6
Heatstroke ..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..
Sunstroke ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
195. Lightning Stroke ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
196. Electric Shock ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
197. Murder by Firearms ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
198. Murder by Cutting or Stabbing Instruments ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
199. Murder by other means ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
200. Infanticide (Murder of an Infant under one year ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
201. <i>A.</i> —Dislocation ..	..	..	..	..	..	4	..	4	..	..	4	..	2	..	..	41	3
<i>B.</i> —Sprain ..	..	..	..	..	..	14	..	1	..	..	5	..	35	..	..	128	1
<i>C.</i> —Fracture ..	..	..	..	..	..	9	..	1	..	..	24	..	2	..	..	412	50
202. Other External Injuries ..	..	..	..	..	..	98	..	2	..	..	49	..	3	..	..	79	1,449
203. Deaths by Violence of unknown cause ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,528
Compression of brain ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8



**RETURN OF DISEASES (Out-Patients).**  
NUMBERS TREATED DURING THE YEAR 1930.

## RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

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RETURN OF DISEASES—OUT-PATIENTS—*Contd.*:

DISEASES	EUROPEAN OFFICIALS			NON-EUROPEAN OFFICIALS (including Asiatics)			NATIVE GENERAL POPULATION (including Asiatics)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
<b>I.—EPIDEMIC, ENDEMIC AND INFECTIOUS DISEASES—(Contd.).</b>									
36. Tuberculosis of other Organs—									
(a) Skin or Subcutaneous Tissue (Lupus)	..	..	..	..	..	..	4	..	4
(b) Bones	..	..	..	..	..	..	1	..	1
(c) Lymphatic System	..	..	..	..	..	..	35	..	35
(d) Genito-urinary	..	..	..	..	..	..	..	..	..
(e) Other Organs	..	..	..	..	..	..	..	..	..
37. Tuberculosis disseminated—									
(a) Acute	..	..	..	..	..	..	..	..	..
(b) Chronic	..	..	..	..	..	..	..	..	..
38. Syphilis—									
(a) Primary	..	..	..	..	..	..	5	..	5
(b) Secondary	..	..	..	..	..	..	3	..	3
(c) Tertiary	..	..	..	..	..	..	..	..	..
(d) Hereditary	..	..	..	..	..	..	..	..	..
(e) Period not indicated	..	..	..	..	..	..	..	..	..
39. Soft Chancre	..	..	..	..	..	..	4	..	4
40. A.—Gonorrhœa and its complications	..	..	..	..	..	..	..	..	..
B.—Gonorrhœal Ophthalmia	..	..	..	..	..	..	..	..	..
C.—Gonorrhœal Arthritis	..	..	..	..	..	..	..	..	..
D.—Granulomo Venereum	..	..	..	..	..	..	..	..	..
41. Septicaemia	..	..	..	..	..	..	..	..	..
42. Other Infectious Diseases	..	..	..	..	..	..	..	..	..
Trypanosomiasis	..	..	..	..	..	..	..	..	..
<b>II.—GENERAL DISEASES NOT MENTIONED ABOVE.</b>									
43. Cancer or other Malignant Tumours of the Buccal Cavity	..	..	..	..	..	..	..	..	..
44. Cancer or other Malignant Tumours of the Stomach or Liver	..	..	..	..	..	..	..	..	..
45. Cancer or other Malignant Tumours of the Peritoneum Intestines, Rectum	..	..	..	..	..	..	..	..	..
							2	..	2
							4	..	4
							1	..	1
							2	..	2

RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

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## RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			NON-EUROPEAN OFFICIALS (including Asiatics)			NATIVE GENERAL POPULATION (including Asiatics)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<b>II.—GENERAL DISEASES NOT MENTIONED ABOVE—(Contd.).</b>												
66. Alcoholism	..	..	..	1	..	1	..	..	..	2	..	2
67. Chronic poisoning by mineral substances (Lead, Mercury, etc.)	..	..	..	..	..	..	..	..	..	..	..	..
68. Chronic poisoning by organic substances (Morphia, Cocaine, etc.)	..	..	..	..	..	..	..	..	..	..	..	..
69. Other General Diseases—	..	..	..	..	..	..	..	..	..	..	..	..
Auto-intoxication..	..	..	..	..	..	..	..	..	..	..	..	..
Purpura Hæmorrhagica..	..	..	..	..	..	..	..	..	..	..	..	..
Hæmophilia..	..	..	..	..	..	..	..	..	..	..	..	..
Diabetes Insipidus ..	..	..	..	..	..	..	..	..	..	..	..	..
<b>III.—AFFECTIONS OF THE NERVOUS SYSTEM AND ORGANS OF THE SENSES.</b>												
70. Encephalitis (not including Encephalitis Lethargica)	..	..	..	..	..	..	..	..	..	2	..	2
71. Meningitis (not including Tuber-culous Meningitis or Cerebro-spinal Meningitis)	..	..	..	..	..	..	..	..	..	..	..	..
72. Locomotor Ataxia	..	..	..	..	..	..	..	..	..	..	..	..
73. Other affections of the Spinal Cord	..	..	..	..	..	..	..	..	..	..	..	..
74. Apoplexy—	..	..	..	..	..	..	..	..	..	..	..	..
(a) Haemorrhage	..	..	..	..	..	..	..	..	..	..	..	..
(b) Embolism	..	..	..	..	..	..	..	..	..	..	..	..
(c) Thrombosis ..	..	..	..	..	..	..	..	..	..	..	..	..
75. Paralysis—	..	..	..	..	..	..	..	..	..	..	..	..
(a) Hemiplegia ..	..	..	..	..	..	..	..	..	..	..	..	..
(b) Other Paryses ..	..	..	..	..	..	..	..	..	..	..	..	..
76. General Paralysis of the Insane ..	..	..	..	..	..	..	..	..	..	..	..	..
77. Other forms of Mental Alienation	..	..	..	..	..	..	..	..	..	..	..	..
78. Epilepsy ..	..	..	..	..	..	..	..	..	..	..	..	..
79. Eclampsia Convulsions (non-puerperal) 5 years or over ..	..	..	..	..	..	..	..	..	..	..	..	..
80. Infantile Convulsions ..	..	..	..	..	..	..	..	..	..	..	..	..
81. Chorea ..	..	..	..	..	..	..	..	..	..	..	..	..
Neuralgia ..	..	..	..	..	..	..	..	..	..	..	..	..

## RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

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RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			Non-EUROPEAN OFFICIALS (including ASIATICS)			NATIVE GENERAL POPULATION (including ASIATICS)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<b>IV.—AFFECTIONS OF THE CIRCULATORY SYSTEM—(Contd.).</b>												
93. Diseases to the Veins—												
Hæmorrhoids .....	2	..	2	5	1	6	16	..	13	100	8	1
Varicose Veins .....	..	..	..	1	..	1	..	..	2	..	..	1
Phlebitis .....	..	..	..	2	..	2	..	..	..	..	..	..
94. Diseases of the Lymphatic System—												
Lymphangitis .....	1	..	1	1	..	1	..	..	..	..	..	..
Lymphadenitis, Bubo (non-specific) .....	..	..	..	2	..	2	..	..	..	..	..	..
95. Hæmorrhage of undetermined cause .....	..	..	..	4	5	9	2	..	2	276	11	287
96. Other affections of the Circulatory System .....	1	..	1	..	..	..	1	..	1	6	30	36
	1	..	1	1	..	1	..	..	1	15	4	19
<b>V.—AFFECTIONS OF THE RESPIRATORY SYSTEM.</b>												
97. Diseases of the Nasal Passages—												
Adenoids .....	..	..	..	1	1	3	..	..	1	12	9	21
Polypus .....	..	..	..	..	..	..	..	..	..	7	..	7
Rhinitis .....	..	..	..	2	..	1	..	..	..	45	..	70
Coryza .....	..	..	..	84	1	85	18	15	33	414	3,850	4,335
Frontal Sinus .....	..	..	..	..	..	..	..	..	..	..	..	..
98. Affections of the Larynx—												
Laryngitis .....	..	..	..	1	..	1	4	2	6	..	..	..
99. Bronchitis—												
(a) Acute .....	..	..	..	44	..	44	17	43	35	..	19,820	24,013
(b) Chronic .....	..	..	..	..	..	..	6	8	34	..	2,381	3,59
100. Broncho-pneumonia .....	..	..	..	..	..	..	..	..	9	..	103	161
101. Pneumonia—												
(a) Lobar .....	..	..	..	..	..	..	..	..	..	246	28	274
(b) Unclassified .....	..	..	..	..	..	..	..	..	..	58	17	75
102. Pleurisy, Empyema .....	..	..	..	1	..	1	..	..	..	..	80	7
103. Congestion of the Lungs .....	..	..	..	..	..	..	..	..	..	2	..	3
104. Gangrene of the Lungs .....	..	..	..	2	..	2	..	..	..	37	..	37
105. Asthma .....	..	..	..	..	..	..	..	..	..	6	..	..
106. Pulmonary Emphysema .....	..	..	..	..	..	..	..	..	..	..	4	..
107. Other affections of the Lungs												
Pulmonary Spirochaetosis .....	..	..	..	1	..	1	..	..	..	..	712	141
Pleurodynia .....	..	..	..	..	..	..	..	..	..	2	..	..
	..	..	..	..	..	..	..	..	..	..	..	..

RETURN OF DISEASES—OUT-PATIENTS—(Contd.)

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RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

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DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			NON-EUROPEAN OFFICIALS (including Asiatics)			NATIVE GENERAL POPULATION (including Asiatics)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
VII.—DISEASES OF THE GENITO-URINARY SYSTEM (NON-VENEREAL) —(Contd.).												
134. Diseases of the Urethra—												
(a) Stricture ..	..	..	..	..	..	..	..	..	..	44	..	3
(b) Other ..	..	..	..	..	..	..	..	..	..	85	..	..
135. Diseases of the Prostate—												
Hypertrophy ..	..	..	..	..	..	..	..	..	..	3	..	..
Prostatitis ..	..	..	..	..	..	..	..	..	..	7	..	..
136. Diseases (Non-veneral) of the Genital Organs of Man—												
Epididymitis ..	..	..	..	..	..	..	..	..	..	13	..	..
Orchitis ..	..	..	..	..	..	..	..	..	..	14	..	..
Hydrocole ..	..	..	..	..	..	..	..	..	..	157	..	..
Ulcer of Penis ..	..	..	..	..	..	..	..	..	..	155	..	..
Phymosis ..	..	..	..	..	..	..	..	..	..	19	..	..
Cysts or other Non-malignant Tumours of the Ovaries ..	..	..	..	..	..	..	..	..	..	..	..	..
137. Salpingitis—												
Abscess of the Pelvis ..	..	..	..	..	..	..	..	..	..	1	..	..
139. Uterine Tumours (Non-malignant) ..	..	..	..	..	..	..	..	..	..	..	..	..
140. Uterine Haemorrhage (Non-puerperal) ..	..	..	..	..	..	..	..	..	..	..	..	..
141. A.—Metritis ..	..	..	..	..	..	..	..	..	..	..	..	..
B.—Other affections of the Female Genital Organs—												
Displacement of Uterus ..	..	..	..	..	..	..	..	..	..	9	..	..
Amenorrhœa ..	..	..	..	..	..	..	..	..	..	4	..	..
Dysmenorrhœa ..	..	..	..	..	..	..	..	..	..	5	..	..
Leucorrhœa ..	..	..	..	..	..	..	..	..	..	2	..	..
Menorrhagia ..	..	..	..	..	..	..	..	..	..	6	..	..
142. Diseases of the Breast (Non-puerperal)—												
Mastitis ..	..	..	..	..	..	..	..	..	..	4	..	..
Abscess of Breast ..	..	..	..	..	..	..	..	..	..	52	..	..
143. VIII.—PUERPERAL STATE.										38	..	..
A.—Normal Labour ..	..	..	..	..	..	..	..	..	..	..	..	..
B.—Accidents of Pregnancy—												
(a) Abortion ..	..	..	..	..	..	..	..	..	..	1	..	..
(b) Ectopic Gestation ..	..	..	..	..	..	..	..	..	..	1	..	..
(c) Other accidents of Pregnancy ..	..	..	..	..	..	..	..	..	..	1	..	..
										18	..	..
										93	..	..
										31	..	..
										31	..	..
										18	..	..

## RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			NON-EUROPEAN OFFICIALS (including Asiatics)			NATIVE GENERAL POPULATION (including Asiatics)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<b>VIII.—PUERPERAL STATE—(Contd.).</b>												
144. Puerperal Hæmorrhage	..	..	..	..	..	..	..	..	..	2	11	11
145. Other accidents of Parturition	..	..	..	..	..	..	..	..	..	6	6	6
146. Puerperal Septicæmia	..	..	..	..	..	..	..	..	..	..	..	..
147. Phlegmasia Dolens	..	..	..	..	..	..	..	..	..	..	..	..
148. Puerperal Eclampsia	..	..	..	..	..	..	..	..	..	..	..	..
149. Sequælae of Labour	..	..	..	..	..	..	..	..	..	13	13	13
150. Puerperal affections of the Breast	..	..	..	..	..	..	..	..	..	12	12	12
<b>IX.—AFFECTIONS OF THE SKIN AND CELLULAR TISSUES.</b>												
151. Gangrene ..	..	..	..	..	..	..	..	..	..	2	1,131	1,131
152. Boil ..	..	..	..	..	..	..	..	..	..	122	171	171
Carbuncle ..	..	..	..	..	..	..	..	..	..	1	21	21
153. Abscess ..	..	..	..	..	..	..	..	..	..	32	1,037	1,037
Whitlow ..	..	..	..	..	..	..	..	..	..	9	183	183
Cellulitis ..	..	..	..	..	..	..	..	..	..	52	1,303	1,303
Ulcers ..	..	..	..	..	..	..	..	..	..	..	..	..
154. A.—Tinea ..	..	..	..	..	..	..	..	..	..	2	353	353
B.—Scabies ..	..	..	..	..	..	..	..	..	..	24	6,713	6,713
155. Other Diseases of the Skin—	..	..	..	..	..	..	..	..	..	..	..	..
Erythema ..	..	..	..	..	..	..	..	..	..	46	654	654
Urticaria ..	..	..	..	..	..	..	..	..	..	24	24	24
Eczema ..	..	..	..	..	..	..	..	..	..	..	..	..
Herpes ..	..	..	..	..	..	..	..	..	..	..	..	..
Psoriasis ..	..	..	..	..	..	..	..	..	..	..	..	..
Elephantiasis ..	..	..	..	..	..	..	..	..	..	..	..	..
Myiasis ..	..	..	..	..	..	..	..	..	..	..	..	..
Chigoes ..	..	..	..	..	..	..	..	..	..	..	..	..
Cutaneous Leishmaniasis ..	..	..	..	..	..	..	..	..	..	..	..	..
Ulcers ..	..	..	..	..	..	..	..	..	..	..	..	..
Prickly Heat ..	..	..	..	..	..	..	..	..	..	..	..	..
Other Diseases—Skin ..	..	..	..	..	..	..	..	..	..	..	..	..

RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

**M E D**

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DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			Non-EUROPEAN OFFICIALS (including ASIATICS)			NATIVE GENERAL POPULATION (including ASIATICS)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
X.—DISEASES OF BONES AND ORGANS OF LOCOMOTION (OTHER THAN TUBERCULOUS).												
156. Diseases of Bones—	..	..	..	..	..	..	..	..	..	..	..	..
Osteitis ..	..	..	..	3	..	3	5	..	5	..	..	6
157. Diseases of Joints—	..	..	..	..	..	..	2	1	1	..	..	105
Arthritis ..	..	..	..	..	..	..	1	4	5	..	..	642
Synovitis ..	..	..	..	1	..	1	..	..	..	..	..	609
Bursitis ..	..	..	..	..	..	..	..	..	..	..	..	..
158. Other Diseases of Bones or Organs of Locomotion ..	..	..	..	..	..	..	..	..	..	..	..	..
Other Diseases—Connective Tissue ..	..	..	..	35	..	35	13	7	20	..	..	5732
XI.—MALFORMATIONS.												
159. Malformations—	..	..	..	..	..	..	..	..	..	..	..	..
Hydrocephalus ..	..	..	..	..	..	..	..	..	..	..	..	..
Hypopspadias ..	..	..	..	..	..	..	..	..	..	..	..	..
Spina Bifida ..	..	..	..	..	..	..	..	..	..	..	..	..
XII.—DISEASES OF INFANCY.												
160. Congenital Debility ..	..	..	..	..	..	..	..	..	..	..	..	..
161. Premature Birth ..	..	..	..	..	..	..	..	..	..	..	..	..
162. Other affections of Infancy ..	..	..	..	..	..	..	..	..	..	..	..	..
163. Infant neglect (infants of three months or over) ..	..	..	..	..	..	..	..	..	..	..	..	..
XIII.—AFFECTIONS OF OLD AGE.												
164. Senility—	..	..	..	..	..	..	..	..	..	..	..	..
Senile Dementia ..	..	..	..	..	..	..	..	..	..	..	..	..

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RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

**M E D**

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DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			NON-EUROPEAN OFFICIALS (including Asiatics)			NATIVE GENERAL POPULATION (including Asiatics)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<b>XIV.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES—(Contd.).</b>												
190. Wounds inflicted on Active Service	..	..	..	..	..	..	..	..	..	..	..	..
191. Executions of Civilians by Believers	..	..	..	..	..	..	..	..	..	..	..	..
192. A.—Over Fatigue	..	..	..	..	..	..	..	..	..	..	..	..
B.—Hunger or Thirst	..	..	..	..	..	..	..	..	..	..	..	..
193. Exposure to Cold, Frostbite, etc.	..	..	..	..	..	..	..	..	..	..	..	..
194. Exposure to Heat—	..	..	..	..	..	..	..	..	..	..	..	..
Heatstroke	..	..	1	..	..	..	..	..	..	..	..	..
Sunstroke	..	..	2	..	..	2	..	..	..	..	..	3
195. Lightning Stroke..	..	..	..	..	..	..	..	..	..	..	..	..
196. Electric Shock	..	..	..	..	..	..	..	..	..	..	..	..
197. Murder by Firearms	..	..	..	..	..	..	..	..	..	..	..	..
198. Murder by Cutting or Stabbing Instruments	..	..	..	..	..	..	..	..	..	..	..	..
199. Murder by other means	..	..	..	..	..	..	..	..	..	..	..	..
200. Infanticide (Murder of an Infant under one year	..	..	..	..	..	..	..	..	..	..	..	..
201. A.—Dislocation	..	..	3	..	..	3	..	..	..	..	..	..
B.—Sprain	..	..	14	..	..	14	10	2	12	..	..	38
C.—Fracture	..	..	2	..	..	2	10	4	14	..	..	744
202. Other External Injuries	..	..	173	..	..	178	65	20	7	..	..	142
203. Deaths by Violence of unknown cause	..	..	..	..	..	..	..	..	695	..	..	22710
										..	..	..
<b>XV.—ILL. DEFINED DISEASES.</b>												
204. Sudden Death (cause unknown)	..	..	..	..	..	..	..	..	..	..	..	..
205. A.—Diseases not already specified or ill-defined—	..	..	..	..	..	..	..	..	..	..	..	..
Ascites	..	..	..	..	..	..	..	..	..	..	..	..
Oedema	..	..	..	..	..	..	..	..	..	..	..	..
Asthenia	..	..	..	..	..	..	..	..	..	..	..	..
Shock	..	..	..	..	..	..	..	..	..	..	..	..
Hyperpyrexia	..	..	..	..	..	..	..	..	..	..	..	..
Debility	..	..	..	..	..	..	..	..	..	..	..	..
P.U.O.	..	..	..	..	..	..	..	..	..	..	..	..
N.Y.D.	..	..	..	..	..	..	..	..	..	..	..	..
Marasmus	..	..	..	..	..	..	..	..	..	..	..	..
Ainhum	..	..	..	..	..	..	..	..	..	..	..	..
Sun Traumatism	..	..	..	..	..	..	..	..	..	..	..	..
B.—Malingering ..	..	..	..	..	..	..	..	..	..	..	..	..
									..	..	..	..

## RETURN OF DISEASES—OUT-PATIENTS—(Contd.).

DISEASES	EUROPEAN OFFICIALS			EUROPEAN GENERAL POPULATION (NON-OFFICIAL)			NON-EUROPEAN OFFICIALS (including ASIATICS)			NATIVE GENERAL POPULATION (including ASIATICS)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
XVI.—DISEASES, THE TOTAL OF WHICH HAVE NOT CAUSED 10 DEATHS.	..	..	..	..	..	..	..	..	..	..	..	..
GRAND TOTAL	917	61	978	857	437	1,294	5,536	..	5,536	176,140	39,277	215,417
SURGICAL OPERATIONS—												
Under General Anæsthesia	..	1	..	1	5	1	6	..	..	54	22	76
Others	..	..	..	2	..	3	4	..	4	2	..	2
										602	141	743

## APPENDIX A.

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DISTRICT HEALTH OFFICE,

NAIROBI.

27th May, 1931.

THE HON. DIRECTOR OF MEDICAL AND SANITARY SERVICES,  
MEDICAL DEPARTMENT, NAIROBI.

SIR,

I beg to present a summary of the work performed in connexion with the medical supervision of school children during the year 1930. For descriptive purposes it may be divided into two sections : the routine and the special.

2. The routine work is based upon the regular medical inspection of children and others attending schools, and the procedure has been described at length in my annual report for 1929.

So far as Europeans are concerned, scholars included in the 1930 examinations belonged to one or more of the following groups : (1) those referred for treatment or observation at the time of the previous inspection, (2) those who gave a history of illness during the period 1929 to 1930, and (3) new scholars.

The schools included in the survey were those at Kitale and Eldoret, in the Uasin Gishu, and at Nakuru.

With the exception of those in Nairobi, visits were paid to the more important Indian schools between Kitale and the Coast. As with Europeans, the practice has been to notify parents of all defects, the treatment of which is left to them. In cases where incipient disease is suspected, it is essentially the teacher's duty to look for its signs (which have, of course, been described to him), and to persuade the subjects to seek medical aid should any of the signs be forthcoming.

In regard to Arabs and Africans, with three exceptions, circuits have included only those schools at or near a fairly large centre, where medical aid is readily available; the majority of the schools that lie away from the beaten track are yet untouched.

Routine school work deals with subjects who may or may not enjoy good health. Where ill health is present, they are usually so slightly inconvenienced that they do not feel obliged to alter their daily routine in order to seek or follow medical advice. Even when an examination reveals a minor defect, it is often difficult to persuade the patients to visit the local dispensary; moreover, the suggestion that their pupils should lose an hour or more of their school time in doing so is not favourably viewed by school teachers. In order to combat these difficulties, clinics were established in Nairobi and Mombasa at the school premises, and I think they have amply justified their existence.

3. Three hundred and ninety-two European scholars were examined in detail, and 226 were partially inspected during the early part of the year in order to ascertain any benefits that might have resulted from the 1929 inspection.

The following list shows the nature and number of defects discovered during the period under review :—

TOTAL NUMBER EXAMINED .. .. .. .. ..	392
Boys .. .. .. .. ..	212
Girls .. .. .. .. ..	180
Absence of vaccination scars .. .. .. .. ..	68 (17.3%)
Teeth Caries only .. .. .. .. ..	119 (30.3%)
Untreated caries, and past caries treated by conservation in the same subject .. .. .. .. ..	29 (7.4%)
Past caries adequately treated by conservation .. .. .. .. ..	55 (14%)
Past caries treated by extraction .. .. .. .. ..	39 (9.9%)
Tonsils Simple hypertrophy .. .. .. .. ..	55 (14%)
Diseased .. .. .. .. ..	32 (8.1%)
Spleen enlarged with or without signs of a secondary anaemia .. ..	28
Skin diseases .. .. .. .. ..	5
Diseases of the eye .. .. .. .. ..	2
Surgical conditions .. .. .. .. ..	5
Other conditions .. .. .. .. ..	17
Number examined for acuity of vision .. .. .. .. ..	144
Number with visual acuity less than normal on account of	
Refractive errors .. .. .. .. ..	14 (9.8%)
Injury .. .. .. .. ..	1
Squint .. .. .. .. ..	3
Unknown cause .. .. .. .. ..	1
Refractive errors adequately corrected (in a total of 14) .. ..	6
Squints, early with normal vision or adequately corrected .. ..	4
Number of cases with clinical signs of "eye-strain" .. ..	6

In a total of 392 children, 216 (or 55 per cent) were found to require medical or dental attention on account of 256 defects, details of which were either notified to parents or placed in the hands of headmasters. It has been stated that the prescribed notice to parents contains the request that the School Medical Officer be informed of any treatment that may be carried out. No replies followed any of the notes of advice sent out in 1930.

During the routine inspection of 1930, 146 pupils were re-examined because they had been referred for attention during 1929 on account of 203 defects, and it was found that slightly more than half the total number of defects were either treated or no longer required attention. Details of this statement are tabulated below :—

		Nature and number of defects referred for treatment or observation during 1929	Number of defects remaining in the same condition (i.e. unattended) in 1930
Absence of vaccination scars .. .. .. .. ..	79	25	
Dental defects .. .. .. .. ..	77	42	
Visual disorders .. .. .. .. ..	9	6	
Other conditions .. .. .. .. ..	38	22	
TOTAL .. ..	203	95	

4. The following table shows the nature and number of abnormal conditions discovered among 921 Indian students :—

	Up-country Schools	Ismailia Boys' School, Mombasa	Allidina Visram High School, Mombasa	(Miss Twining) Ismailia Girls' School, Mombasa	Total
	(1)	(2)	(3)	(4)	(5)
Total number examined .. .	134	213	434	140	921
Boys .. . . .	107	213	434	0	754
Girls .. . . .	27	0	0	140	167
Absence of vaccination scars ..	14	6	6	..	28 (3%)
Teeth—					
Caries only .. . .	56	83	131	50	320 (34.7%)
Past caries treated by conservation .. . .	2	0	6	..	8
Past caries treated by extraction .. . .	..	..	1	..	1
Tonsils—					
Simple hypertrophy .. .	7	59	51	16	133 (14.4%)
Diseased .. . .	14	28	39	21	102 (11%)
Spleen enlarged with or without signs of a secondary anaemia	4	37	17	..	58
Chest - Physical signs suggestive of early tuberculosis ..	1	0	3	..	4
Skin diseases .. . .	1	14	13	..	28
Surgical conditions .. . .	..	3	9	..	12
Other conditions .. . .	..	3	2	3	8
Number examined for visual acuity .. . . .	36	152	329	140	657
Number with visual acuity less than normal on account of—					
Refractive errors .. .	2	25	56	21	104 (15.8%)
Disease .. . . .	2	4	14	0	20 (3%)
Injury .. . . .	1	2	1	0	4 (0.6%)
Squint .. . . .	1	0	0	0	1 (0.1%)
Cause unknown .. .	0	0	3	0	3 (0.4%)
Refractive errors adequately corrected (in a total of 104) ..	0	1	6	..	7 (6.7%)
Refractive errors inadequately corrected (in a total of 104) ..	0	2	7	..	9 (8.5%)
Diseases of the eye—					
Trachoma or "possible" trachoma .. . .	28	22	41	..	91 (11.3%)
Other diseases .. . .	1	5	9	..	15

In a total of 779 students (it is possible to keep under observation this number only), 380 (or 48 per cent) were referred for medical or dental attention on account of 460 defects. The last figure does not include caries of the temporary dentition.

During the 1930 routine inspections, 178 students were re-examined, because all the members of this batch had been referred for attention at the time

of the previous inspection. It was found that 41 per cent of their defects had either been treated or no longer required to be placed on the "observation" list. The statement may be expressed more clearly in tabular form :—

				Nature and number of defects in a total of 178 persons) referred for attention in 1929	Number of defects remaining in the same condition (i.e. unattended) in 1930
Absence of vaccination scars	..	..	..	51	7
Dental defects	..	..	..	97	67
Visual disorders	..	..	..	32	27
Other conditions	..	..	..	42	31
	TOTAL	..	..	222	132

5. In recording the results of inspections carried out among the Arab and African communities, I have omitted the Nairobi figures. They would not represent a true record of the incidence of disease, as the examinations in this area included a large number of sickly persons. The remainder are tabulated below :—

	Kavirondo District	Machakos District	Arab and Swahili Communities in Mombasa	Coast Schools other than in Mombasa	Total
Total number examined—	..	60	75	365	171
Males ..	..	60	75	319	171
Females ..	..	0	0	46	0
Absence of vaccination scars ..	..	51	19	19	59
Teeth—Caries ..	..	1 (1·6%)	11 (14·6%)	78 (21%)	18 (10·8%)
Tonsils—					
Simple hypertrophy ..	..	5	13	46	12
Diseased ..	..	1	1	18	5
Spleen enlarged with or without signs of a secondary anaemia	..	8	25	66	90
Chest—Physical signs suggestive of early tuberculosis..	..	2	0	4	2
Skin diseases ..	..	4	2	10	14
Surgical conditions ..	..	0	1	18	2
Other conditions ..	..	1	2	24	7
Eye diseases—					
Trachoma or "possible" trachoma ..	..	0	0	29 (7·9%)	7
Other eye diseases ..	..	0	0	6	1
Number examined for visual acuity ..	..	60	75	312	0
Number with visual acuity less than normal on account of					
Refractive errors..	..	0	0	6	—
Injury ..	..	2	0	3	—
Disease ..	..	2	0	2	—
Squint ..	..	0	0	0	—
Cases of early squint with normal vision ..	..	0	0	0	1

6. The results of laboratory examinations are listed below :—

INDIAN SCHOOLS IN MOMBASA

Number of blood smears examined for malarial parasites	..	..	238
Number negative	..	..	215 (90·3%)
Number positive	..	..	23 (9·6%)
Subtertian	..	..	22
Quartan	..	..	1

Average distribution of white blood cells in fifty smears selected at random :

Polymorphs	..	..	..	..	51·09%
Lymphocytes	..	..	..	..	39·37%
Large mononuclears	..	..	..	..	2·04%
Eosinophiles	..	..	..	..	7·5%

Number of stools examined for eggs of helminths and for protozoa .. 89

Number negative	..	..	..	..	33 (37%)
Number positive	..	..	..	..	56 (62·9%)

Types of parasites and number of times each variety occurred :

Anchylostoma	..	..	..	..	1 (1·1%)
Ascaris	..	..	..	..	29 (31·4%)
Trichuris	..	..	..	..	37 (41·5%)
Tænia	..	..	..	..	0 (0·0%)

ARAB AND AFRICAN SCHOOLS

	Nairobi	Kavirondo	Machakos	Coast Area other than Mombasa	Mombasa
Number of blood smears examined for malaria parasites	..	60	109	99	99
Number negative	..	50	90	80	75
Number positive	..	(83·3%)	(82·6%)	(80·8%)	(75·7%)
Subtertian	..	10	19	19	24
Subtertian and quartan	..	0	1	0	1
Benign tertian	..	0	0	1	0
Average distribution of white blood cells in a number of smears selected at random					
Polymorphs	..	45·9%	44·3%	..	46·5%
Lymphocytes	..	44·1%	48·7%	..	40·8%
Large mononuclears	..	2·6%	2·3%	..	2·4%
Eosinophiles	..	7·4%	4·7%	..	10·3%
Number of stools examined for eggs of helminths and for protozoa	..	126	60	107	181
Number negative	..	29	10	83	3
Number positive	..	(23%)	(16·6%)	(78%)	(1·6%)
		97	50	24	178
		(77%)	(83·3%)	(22%)	(98·4%)
Number positive	..				(88·6%)
Types of parasite and number of times each variety occurred					
Anchylostoma	..	26	12	1	29
		(20·6%)	(20%)	(0·9%)	(16%)
Ascaris	..	19	16	1	131
		(15%)	(23·3%)	(0·9%)	(72%)
Trichuris	..	18	21	0	34
		(14·2%)	(35%)	(0·0%)	(18·7%)
Strongyloides	..	5	7	1	3
Oxyuris	..	2	1	0	0
S. Mansonii	..	2	1	1	0
Tænia	..	46	28	20	0
		(36·5%)	(46·6%)	(18·6%)	(0·0%)
H. nana	..	2	0	0	0
E. coli	..	21	0	—	—
E. histolytica	..	2	0	0	—
Other protozoal forms	..	8	0	0	—

7. *Vaccinations.*—In 1929, 37·2 per cent of the European school children and 14·7 per cent of the Indian students were unvaccinated, but this year records show that only 17·3 per cent of the former and 3 per cent of the latter are still unprotected from smallpox. This is an improvement, but from time

to time unvaccinated children will be entering the schools as new pupils, and without constant supervision the figures are almost certain to increase. This can be easily prevented if due attention is paid to the provisions contained in section 112 of the Public Health Ordinance : " No child shall be admitted to or attend any school until there has been produced to the person in charge thereof a certificate or other satisfactory evidence that the provisions of this part (i.e. the necessity for vaccination) in respect of such child have been complied with."

8. *Teeth.*—The incidence of dental decay, either past or present, amounts to 61.1 per cent among the European children. This figure is high in relation to last year's record, and I can only explain it by the fact that the examination of the mouth may have been more detailed. It would doubtless have been much higher had the inspection been carried out by a dental surgeon, or with the care and exactitude that such a person would employ. Untreated caries is present in 37.7 per cent of the total number of persons examined, and there is no evidence of increased conservation of existing dental flaws.

9. *Tonsils.*—So far as Europeans are concerned, the incidence of simple hypertrophy of the tonsils is placed at 14 per cent, while actual and obvious disease of the tissue is recorded as being present in 8 per cent. Most of the subjects showed the presence of enlarged glands in the anterior triangle of the neck. I have great difficulty in deciding, on a single examination, whether a tonsil is likely to be the cause of trouble or not, as I hardly ever see a child when he is ill, and since histories of illness that may be traced to the tonsil are so vague. I tried to use the gain in weight and height over a period of one year as a guide; in some cases of tonsilar enlargement there was a definite failure to gain; in others, a good rate of development was present. None of the cases recorded as simple hypertrophy were notified to parents, yet I feel that some of them were really in need of attention. The doctor who makes a routine inspection once a year would be greatly assisted if he had before him a record of any illness that took place during the past twelve months. At boarding schools this would be an easy matter if every child were supplied with a " history sheet," containing a description of all illnesses.

10. *Vision.*—Only 144 European children were examined in detail for vision. Acuity less than normal on account of refractive errors and squints was discovered in 11 per cent of the total number examined. Less than half the refractive errors were adequately corrected.

In a total of 657 Indian students, 104 (or 15.8 per cent) had reduction of visual acuity on account of refractive errors, by far the commonest being myopia. Most of the cases were simple myopia, the type that progresses to a certain stage and remains there, but there were also quite a number of cases of the acute variety, which tends to progress rapidly, and is nearly always accompanied by degenerative changes at the back of the eyeball. In a total of 104 refractive errors, 7 (or 6.7 per cent) were adequately corrected, and 9 (or 8.6 per cent) were inadequately corrected. When visiting Indian schools one is often told that there are certain students who cannot see the blackboard even from the front benches. This has been brought to the notice of their parents, but nothing is done, and so they remain for many years of their school life. The 1930 figure representing the incidence of refractive errors is much higher than that recorded during the previous year. A proportionately larger number of persons over the age of 14 were examined during the period under review than during 1929, and, since myopia seems to make its appearance between the ages of 11 and 14, the high figure of 1930 is not unexpected.

So far as the Arab and African communities are concerned, errors of refraction were discovered only among the Coast children with Arab blood. This corresponds to the records prepared in 1929, and also to the reports of the Nairobi Eye Clinic. Although one is frequently consulted by Africans who complain of discomfort after close work, it seems that their trouble is invariably due to reading in a bad atmosphere and with a poor light.

11. *Diseases of the Eye.*—The only eye disease encountered among European children was a very mild condition characterized by the presence of small granules throughout the conjunctivae, but only in two instances was it

of sufficient severity to cause discomfort. It is recorded as a matter of interest, as it seems to be a mild form of follicular conjunctivitis—a complaint that was prevalent in Nairobi during the months of April, May and June.

So far as other communities are concerned, trachoma is the commonest eye disease. The incidence of definite and "possible" cases amounted to 11 per cent among the Indians in all districts, and 7.9 per cent among the Arab and Swahili boys in Mombasa. The majority of the school cases were in the early stages of the disease, when little discomfort is experienced, and complications are still absent. On account of this, our first attempts at securing treatment were very unpopular; however, when teachers and parents became more familiar with the gravity of the disease and the severity of its complications, the attendances at the clinics soon increased. At two Mombasa schools the disease, although by no means stamped out, has been rendered quiescent and comparatively non-infective.

Last year a number of early or "possible" cases of trachoma were missed on account of the similarity between the early stages of this disease and the more pronounced form of simple follicular conjunctivitis—a condition usually devoid of much discomfort, and which disappears rapidly under appropriate treatment, and occasionally without any treatment whatsoever. When these possible cases were seen again in 1930 it was obvious that the majority of them had developed a good-going trachoma; that is to say, during the period between the 1929 and 1930 inspections, they had progressed into the infective stage without steps being taken to see that they were placed under medical observation. This is a lesson that has taught us to regard all granular conjunctivæ as being possible trachomas when found among the Asian, Arab or Swahili communities.

Although very severe forms of trachoma are seen among adults, the disease among school children does not appear to have attained the proportions that it is reported to have assumed in other countries. Moreover, it would appear that trachoma is hardly ever contracted at the schools, but invariably at the patients' homes. The family histories point to this. It seems to me that one of the best ways to combat the spread of this disease is by the regular inspection of school children, followed, where necessary, by efficient courses of treatment, and in this connexion I would suggest the establishment of one or more "trachoma schools" as a point worthy of consideration.

12. *Malaria.*—The incidence of malaria, as determined by spleen and parasite rates, varies considerably in different parts of the country. It will be seen from the tables recorded in paragraphs 4, 5 and 6 that quite a large number of the Mombasa school children have enlarged spleens or show the presence of malarial parasites in the blood-stream. At the request of the Medical Officer of Health, I tried to ascertain whether any of their infections were likely to have been contracted in Mombasa. With the exception of two or three, who were very vague as to their previous movements, all the subjects acknowledged that they had been absent from the Island during the previous six months on visits to other parts of the country where malaria is prevalent.

13. During 1930 an attempt was made to ascertain the average blood pressures of school children in different parts of the country, but only among the Indian and Arab communities were the numbers large enough to give a satisfactory set of figures. These are recorded below:—

	AGE GROUPS		
	Under 10 years	10 to 14 years	15 years and over
<b>INDIANS—</b>			
Systolic mm. Hg...	.. .. .. ..	95	104
Diastolic mm. Hg.	.. .. ..	65	68
Difference	.. .. ..	30	36
			43
<b>ARABS—</b>			
Systolic mm. Hg...	.. .. .. ..	96	109
Diastolic mm. Hg.	.. .. .. ..	66	67
Difference	.. .. ..	30	42
			48

14. *Nairobi African School Clinics.*—The following list shows the nature and number of all ailments treated at the Nairobi African School Clinics during 1930 :—

Digestive disorders .. .. .. .. ..	474
Affections of the respiratory tracts.. .. .. .. ..	1,087
Fever, undefined .. .. .. .. ..	455
Skin diseases .. .. .. .. ..	301
Debility and anaemia.. .. .. .. ..	281
Intestinal worms .. .. .. .. ..	207
Diseases of the eye .. .. .. .. ..	169
Diseases of the ear .. .. .. .. ..	63
Scurvy or incipient scurvy .. .. .. .. ..	16
Enlargement of the spleen .. .. .. .. ..	30
Minor injuries .. .. .. .. ..	574
Other conditions .. .. .. .. ..	205
Ailments referred elsewhere for treatment .. .. .. .. ..	119
	3,981

The total number of attendances was 17,568. This figure becomes 19,111 if there are added the attendances for prophylactic quinine during the months of April and May.

A record of the work carried out at the Mombasa School Clinics will appear in the annual report of the Port Health Officer.

15. *Weight and Height Tables.*—The weight and height tables prepared over a period of two years vary only slightly from those submitted in 1929 and early in 1930 ; it would therefore appear unnecessary to include them in this report.

16. *Special Measures unconnected with the Routine Work.*—Hygiene is a subject that receives prominence in the weekly syllabus of most African schools, but it has always seemed to me that very few teachers are familiar with the practical side of this subject. Thus their pupils must find it difficult to see the value of practising the principles they are taught, after they leave the sphere of influence of their teachers, although they may possess a fair knowledge of " what the book says."

Towards the end of the period under review, attempts were made to meet school teachers and to demonstrate to them unhygienic conditions that are typical of their districts, and to show them how these conditions can be removed and prevented. It is, of course, too early to say whether any noticeable benefits have been derived from this measure, but it seems to me that health propaganda, when presented in this way, is likely to have wholesale and far-reaching effects.

Other special measures include inspection of buildings from the sanitary point of view, and the investigation of school dietaries, records of which have been placed before you from time to time throughout the year.

I have the honour to be,

Sir,

Your obedient servant,

G. M. HARGREAVES,  
*School Medical Officer.*



# MEDICAL RESEARCH LABORATORY

## ANNUAL REPORT, 1930

By

W. H. KAUNTZE, M.D., D.P.H.  
*Deputy Director of Laboratory Services.*



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**ANNUAL REPORT OF THE MEDICAL RESEARCH  
LABORATORY, KENYA COLONY AND  
PROTECTORATE, FOR 1930.**

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**STAFF, 1930.**

DEPUTY DIRECTOR OF LABORATORY SERVICES :  
W. H. Kauntze.

SENIOR BACTERIOLOGIST :  
R. P. Cormack.

ASSISTANT BACTERIOLOGISTS :  
F. P. G. de Smidt.  
H. D. Tonking.  
F. W. Vint.

MALARIA RESEARCH OFFICER :  
P. C. C. Garnham (seconded from Medical Division, 15th May, 1930).

GOVERNMENT ANALYST :  
M. H. Fox.

BIOCHEMIST :  
D. Harvey.

MEDICAL ENTOMOLOGISTS :  
C. B. Symes.  
J. I. Roberts (from 11th February, 1930).

LABORATORY SUPERINTENDENT :  
F. A. Bailey.

LABORATORY ASSISTANTS :  
J. A. Bell (until 30th June, 1930).  
H. M. Nefdt.  
W. L. Titman.  
J. P. McMahon.  
A. H. Daws.  
W. A. Doust (from 4th July, 1930).  
E. C. Young (from 28th August, 1930).  
C. E. J. Lamperd (from 26th September, 1930).  
W. E. Grainger (Junior Laboratory Assistant).  
T. Jones (Junior Laboratory Assistant).  
L. Burton (Junior Laboratory Assistant from 1st January, 1930).  
S. J. Moore (Learner, until 30th April, 1930).  
G. Beverly (Learner, from 26th May, 1930).  
Ramji Das.  
W. Pema.  
J. St. A. M. de Souza.  
F. Mohamed (until 25th February, 1930).  
N. Nair.  
O. S. de Souza (from 1st March, 1930).  
Elisha Nyalondo.  
Gideon Otieno.

MALARIAL FIELD OVERSEERS :  
J. O. Harper.  
J. Nimmo.  
T. P. O'Brien (until 31st January, 1930).  
H. A. Kearney (13th March to 31st December, 1930).

LIBRARIAN AND STENOGRAPHER :  
Miss J. Millett.

CLERK :  
Miss J. Webster.

STOREKEEPER :  
Max de Souza.

**A.—ADMINISTRATION.****1.—CHANGES IN STAFF.**

- Mr. J. I. Roberts appointed Medical Entomologist, 3rd January, 1930, and assumed duty on 12th February, 1930.
- Mr. T. P. O'Brien, Malaria Field Overseer, terminated his appointment, 31st January, 1930.
- Mr. F. Mohamed, Laboratory Assistant, resigned on 25th February, 1930.
- Mr. O. S. de Souza, appointed Laboratory Assistant, 1st March, 1930.
- Mr. H. A. Kearney, appointed Malaria Field Overseer, 13th March to 31st December, 1930.
- Dr. P. C. C. Garnham, seconded from Sanitation Division to Laboratory, 15th May, 1930.
- Mr. J. A. Bell, Laboratory Assistant, resigned on 30th June, 1930.
- Mr. W. A. Doust, appointed Laboratory Assistant, 4th July, 1930.
- Mr. E. C. Young, appointed Laboratory Assistant, 28th August, 1930.
- Mr. C. E. J. Lamperd, appointed Laboratory Assistant, 26th September, 1930.

**2.—LEAVE.**

- Mr. J. St. A. M. de Souza proceeded on leave on 19th February, 1930, and returned on 11th August, 1930.
- Captain R. P. Cormack returned from leave on 15th March, 1930.
- Dr. F. W. Vint proceeded on leave on 15th March, 1930, and returned on 29th September, 1930.
- Mr. W. L. Titman proceeded on leave on 10th May, 1930, and returned on 19th December, 1930.
- Dr. D. Harvey proceeded on leave on 17th May, 1930, and returned on 1st December, 1930.
- Mr. C. B. Symes proceeded on leave on 9th August, 1930.
- Dr. H. D. Tonking proceeded on leave on 26th September, 1930.

**3.—STAFF.**

Only two changes took place in the senior officers of the Laboratory during the year, Mr. Roberts being appointed to fill the vacancy created by the transfer of Mr. Hopkins to Uganda in 1929, and Dr. Garnham being seconded from the Sanitation Division of the Department for work as officer in charge of malaria research. A third post of Medical Entomologist, which was inserted in the Estimates for 1930, remained unfilled throughout the year. Of the Laboratory Assistants, one resigned during the year, and three new appointments were made.

During the year further progress has been made in the organization and training of African Laboratory Assistants. They have now been brought into an apprentice system, under which a boy binds himself as an apprentice for a period of five years, and Government undertakes for the same period to give the necessary instruction. The pay of these assistants commences at Sh. 20, and increments of Sh. 10 per month may be granted yearly, according to progress, so that at the end of the five years the boy may draw Sh. 60 per month. All the boys are provided with quarters, or an allowance in lieu thereof. The initial training is given in the Medical Research Laboratory, Nairobi, or in the branch laboratory at Mombasa, and after attaining a reasonable standard of skill in the use of the microscope, making and staining of blood smears, the examination of faeces for helminth ova and protozoa, the staining and examination of sputum and pus, and the method of keeping records, the boy is drafted out to one of the clinical laboratories attached to hospitals in out-stations, where, under the supervision of the medical officer in charge of the hospital, he carries out the routine laboratory work. At periodic intervals, the boy is brought back again to Nairobi or Mombasa for further courses of instruction until, by the end of his apprenticeship, he has a reasonable knowledge of bacteriological, protozoological and helminthological technique.

Many of the boys are incapable of passing beyond this standard, and after finishing their apprenticeship are passed into Grade II, which enables them to rise by yearly increments of Sh. 10 a month to a maximum of Sh. 90 a month. Some of the boys, however, display marked ability in their work, and

such are given the opportunity of specializing in one or other sections of the Medical Research Laboratory at Nairobi, and of advancing into Grade I, which has a maximum of Sh. 150 a month. At the present time, the two best assistants we have are drawing respectively Sh. 120 and Sh. 100; as one is capable of carrying out Wassermann, Sigma and Kahn tests, equally as well as a European assistant, and the other can take complete charge of a small laboratory without supervision, it will be realized that some of these Africans are capable of quite advanced instruction. There is a constant demand for trained African laboratory assistants, and it is quite impossible with the provision made in the Departmental Estimates for African staff to meet them all. In spite of this, however, most of the hospitals and health offices in the country are now provided with a laboratory assistant.

#### 4.—BUILDINGS.

In the 1929 Annual Report it was mentioned that it was hoped to occupy the Calf Section and boys' quarters of the new Laboratory early this year. This was done at the beginning of March, when the Pathological and Entomological Sections were housed in the rooms which ultimately will be used for the preparation of anti-rabic vaccine, and for the manufacture of calf lymph. To a certain extent this relieved the congestion in the old Laboratory, enabling the Government Analyst to have an additional room for water analysis, and the Bacteriological Section a spare room for the preparation of plague vaccine, while the Malaria Section was transferred to a larger room which permitted of an increase in the African assistants to cope with the large influx of slides from various medical officers in native reserves. The main building of the new Laboratory was commenced in January of this year, and, although it was anticipated that it might be ready for occupation by the close of 1930, various difficulties arose, due partly to climatic conditions, and partly to delays in obtaining material ordered from England, so that it is unlikely that the transference of all sections of the Laboratory to the new building will be complete until the end of April, 1931.

The history of the Laboratory has been one of constant extension, particularly since the end of the Great War. When Dr. P. H. Ross first took over charge he was associated with the Veterinary Bacteriologist, and between them they dealt with all bacteriological, chemical and toxicological examinations of human and animal material, as well for Uganda as for what was then the British East Africa Protectorate. It was during this time that Dr. Ross carried out so much of the research work, particularly on trypanosomes and spirilla, for which his name will always be remembered. It was found, however, that the organization was unsuitable; the medical work was therefore divorced from the veterinary, and in 1911 it was also considered essential that an analyst should be appointed to take over charge of the chemical and toxicological examinations. Later still, an assistant to Dr. Ross was appointed in the person of Dr. J. Harvey Pirie, who assumed duty as Pathologist and Assistant Bacteriologist in 1913. In 1914, the Laboratory was made into a separate department, with Dr. Ross as Director. This arrangement persisted until the close of the War, but early in 1919 Dr. Ross was invalidated, and the Bacteriological Section became once more a part of the Medical Department, while the Chemical Section was enlarged and converted into the Department of Chemical Research under the Directorship of Mr. Kirkham. At that time the Bacteriological Section consisted only of two officers and two Indian laboratory assistants, but it was speedily found necessary to increase this staff to cope with the ordinary routine work, which included the preparation of calf lymph and examination of clinical material on behalf of the various hospitals of the country. As the staff expanded, the need for increased accommodation was acutely felt, and as early as 1920 plans for a new Laboratory were designed and taken to England for the consideration of the Advisory Medical Committee of the Colonial Office. The plans, with some slight modification, were passed, and it was anticipated that the new Laboratories would be commenced in 1921 or 1922, but, unfortunately, the finances of the Colony did not permit of it, and when the situation improved, various difficulties arose about the site, and it was not until 1928 that funds were voted which enabled work to be commenced. Meanwhile, on the promotion of Mr. Kirkham to be Director of Agriculture, Zanzibar, the Chemical Research Department was broken up, part of the staff being transferred to the Agricultural Department, and part to the Medical Department for amalgamation with the Bacteriological Section. As arrangements were made to house the

Agricultural Chemists in the Scott Laboratories, a certain amount of accommodation in the old Laboratory building was set free for the use of the Bacteriological Section. Since that time the staff of the Laboratory Division has been gradually augmented to cope with the work demanded of it, which has increased considerably, not only owing to the increased medical staff in the older established hospitals, but also as the result of extension of medical work in native reserves, and the erection of a number of new hospitals, while the provision of small clinical laboratories attached to the various hospitals in the Colony and the need for constant supervision has converted the post of Deputy Director of Laboratory Services largely into an administrative and advisory one, especially as laboratory investigation is almost invariably called for in all clinical research in the Tropics, and the advice of the laboratory staff is constantly sought. Consequently, when the question of building a new Laboratory was rediscussed in 1927, the plans which were then put forward, although they followed in principle the lines of those approved in 1921, had to provide considerably more accommodation. However, it is pleasing to note that these plans were accepted without alteration when the money was finally voted for the building of the new Laboratory. The principle which has been followed in allocating accommodation has been the provision for each officer of a small office, a small laboratory for his personal use, in which he is free to conduct whatever research he may be engaged upon, and a larger laboratory to house his European assistants and the African staff. In addition, accommodation had to be provided for general offices, for the library of the Medical Department which is now of large dimensions, for a museum to house the numerous pathological and entomological specimens which have accumulated, and for stores, animal rooms and dark room.

The main building of the Laboratory is designed in the form of a letter "E," the whole building being but one room deep, with a corridor running round the inner side, so that all rooms are lit by windows on opposite walls, giving a maximum of window accommodation for microscopic use, and leaving a sufficiency of wall space for shelves, cupboards, etc. The building faces east-south-east. On the left of the entrance on the ground floor are the general offices, followed by a large library, reading-room and museum, and at the end of the south wing the sterilizing and media rooms of the Bacteriological Section. On the right of the entrance on the ground floor are the laboratories of the Government Analyst, and in the north wing those of the Biochemist. On the first floor, immediately at the head of the main staircase, is the office and laboratory of the Deputy Director of Laboratory Services, adjoining which is that of the Laboratory Superintendent. Next to this, on the south side of the front of the building, is the section devoted to malaria research, while the south wing is occupied by the Pathological Section and the Bacteriological Section, the latter being situated immediately over the sterilizing and media preparation rooms, and communicating with them by means of a lift. The north side of the front of the building on the first floor is occupied by the Entomological Section, while the north wing on the same floor houses the Medical Biological Section and animal room, and a spare research laboratory. The central block is only one story high over the greater part of its extent, and houses the service rooms, together with a dark room and microphotography room, while across its end is a one-story building for the stores. Immediately behind the stores is the gas house, which houses two high-pressure Silverlite petrol gas plants, which are capable of providing 2,000 cubic feet of gas per hour. Under normal circumstances, each plant supplies only half of the building by means of a ring gas main, with a cut-off in the centre of the front of the building. Should, however, one plant be temporarily out of action, by opening this cut-off, it will be possible for the other plant to supply the whole. Behind the main building are two balancing blocks of single-story buildings, that on the south housing the African laboratory attendants and that on the north providing offices and laboratories for the preparation of calf lymph and anti-rabic vaccine, a calf shed and operating room, and accommodation for experimental animals.

It has long been the opinion of the Department that investigation of the more important diseases of East Africa can best be carried out by selected teams of workers, either chosen from officers already in the appointment of the various Governments, or specially selected from research workers elsewhere. Such teams would be free to carry out research in any part of East Africa where the prevalence of disease renders it advisable, and in order to secure this freedom of movement it is better that accommodation should be

available in existing buildings in the various colonies and protectorates rather than that a special laboratory be built, adapted only for the purposes of the inquiry then in hand. In this way, any money available for the investigation of any special disease can be spent in the provision of personnel and equipment, rather than in stones and mortar in specialized institutes, any multiplicity of which would render research an extravagance in the eyes of the taxpayer. In pursuance of this policy, the new Laboratory has been designed with a view to providing accommodation which can be made available for such teams of workers. A spare research laboratory is available, which it is hoped may be taken advantage of, either by staff recruited on a temporary basis for the purpose of carrying out special investigations into diseases in the Colony, or by research workers who wish to undertake post-graduate work on tropical diseases and who are in possession of a scholarship or fellowship which will enable them to support themselves while resident here. Besides this research laboratory, the accommodation in the various sections will enable medical officers and outside investigators to be provided with bench accommodation in the same rooms as the permanent staff, should they wish to carry out their own laboratory investigations. One of the great advantages which the new Laboratory will afford is the preparation of calf lymph, of plague vaccine and of anti-rabic vaccine under conditions which do not cause the officer responsible anxiety as to danger from contamination. It is only twelve years since calves were vaccinated under a tree in the old Laboratory compound, and the lymph collected from them under the same conditions, and although this arrangement was rectified in 1919 by the provision of buildings in which this work could be carried out, they were but temporary structures of wood and iron, and the dusty conditions which prevailed in the Laboratory could not fail to render the preparation of calf lymph a somewhat hazardous and responsible undertaking. It speaks well for the care exercised during these years that no catastrophe can be attributed to the use of preparations made in the Laboratory.

The site chosen for the new Laboratory is one on the immediate outskirts of the town, in close proximity to the native hospital, whence the bulk of the material is obtained, with ample accommodation in the neighbourhood of the Laboratory for the building of any other hospitals which may be considered necessary in the interests of the population of the town. The site should be free from the dusty conditions which have prevailed in the old Laboratory, and the elevation of the site, some two hundred feet above the general level of the town, together with the absence of overcrowding, should enable workers to carry on their duties in an atmosphere which is healthier and more conducive to concentrated mental work than that with which they had to be content for the past twenty years or so.

##### 5.—GENERAL SURVEY OF ROUTINE WORK.

Some years ago a small number of sera were tested for syphilis and yaws by means of the Kahn test, and the results were reported in the Annual Report for 1926. At that time it was not considered that the Kahn test offered a reliable alternative to the Sigma reaction, but since that time a considerable improvement has been made in the technique, and also in the preparation of the antigen. During this year the Kahn reaction has been used to test a very considerable number of blood sera, and the results compared with those given by the Sigma reaction. It has been found that the Kahn test as now carried out is quite as reliable as the Sigma, and that it compares very favourably with the Wassermann reaction, and has the advantage of being rapid, simple and cheap. Furthermore, it does not require the use of animals for the provision of complement, nor for the preparation of haemolytic serum, both of which reagents in this country are liable to be sources of trouble when dependence is placed entirely on the Wassermann test. It is unfortunate that the Kahn test is not so readily applicable to cerebro-spinal fluids, and for the investigation of these the Sigma reaction remains the routine test. It will be noted that the number of sera investigated by the Sigma or Kahn test is almost double that of 1929. On the other hand there is a distinct fall in the number of Widal reactions performed.

The calf lymph produced during the year shows a decided increase on that of 1929, almost twice the number of doses being manufactured, and almost twice the number of doses issued. The cost of production per dose manufactured has fallen from 0.52 pence per dose in 1929 to 0.31 pence this year. When it is realized that over half a million doses of calf lymph were issued for

use during the year, and that the purchase of a similar amount from outside sources would have cost the Colony at least £12,000, it will be seen that a very considerable saving accrues to Government from having its own laboratory, more especially as this sum of £12,000 represents over one-third of the cost of the whole Laboratory Division of the Department.

In the Bacteriological Section a small increase has occurred in specimens needing cultural examinations. As will be seen from the report of that Section, an outbreak of plague which occurred in Nairobi has been reflected in the increase in the number of positive cases found on microscopical and cultural examinations, both of man and of rats. One of the interesting facts which has come to light during the investigation of plague patients has been the finding of plague bacilli in the sputa of cases which were thought to be ordinary cases of pneumonia. Vaccine preparation has followed the lines laid down in previous years, with the exception that in the case of T.A.B. vaccine the method has been altered slightly, so that it now conforms with that adopted for the preparation of plague prophylactic. Furthermore, cultures chosen for the preparation of the vaccines have been of the "O" type. The amount of plague prophylactic prepared during the year has been very considerably increased, over 400,000 doses having been manufactured, and almost half this amount issued. It is essential in a country where outbreaks may occur unexpectedly that a large reserve supply of plague prophylactic should be kept, for so convinced is the native population of the value of inoculation, that at the first sign of an outbreak in a village the population rushes to the nearest medical officer and demands plague vaccine. Plague prophylactic is an expensive article to import, for which reason, in the days when it was imported from India, the supply very often ran short. It is difficult to estimate what the value of plague prophylactic is, but if we accept the price quoted from South Africa at Sh. 1 a dose, it will be seen that the amount manufactured this year saved the Colony in the neighbourhood of £20,000. Thus, the saving on calf lymph and plague prophylactic alone more than covers the recurrent expenditure on the Laboratory Division, and provides a surplus which would meet interest and provide a sinking fund on the capital expenditure on the new Laboratory. No demand has been made this year for anti-rabic vaccine, but in view of the fact that in the past, when a demand has arisen, it has been an extremely urgent one, preparation of vaccine has been continued, and enough is always on hand for the treatment of three or four cases, while the means of speeding up vaccine production are always available.

During 1930 it has been necessary to maintain the Clinical Laboratory at the Native Hospital, Nairobi, though as soon as the new building is available this laboratory will be absorbed in the Medical Biology Section.

The branch laboratory at Mombasa has carried on its work on the same lines as in previous years, and the number of specimens examined is a tribute to the work of the laboratory assistants who have been in charge of that laboratory, namely Mr. Titman until 10th May, 1930, and Mr. Burton from 10th May to the end of the year.

The Malaria Section has been employed as in previous years in examination of slides sent in either from medical officers in charge of native reserves, or from specially selected places from which they are received monthly, as far as possible from the same individuals. A considerable amount of time has been spent in the devising of a staining technique, as it was found that the methods in use previously gave some variable results, and while reliance was placed upon the criteria which had been recognized by other workers for differentiating the various species of malaria parasite, doubt was constantly expressed as to whether many of the parasites which were designated quartan were not in reality sub-tertian. The new staining technique, which consists of a modification of Gordon's stain in combination with the cleaning of slides in a saturated solution of sodium silicate, enables Maurer's dots to be demonstrated in all the asexual types of sub-tertian parasites, and the result has been the demonstration that many parasites which have been called quartan in the past should have been more correctly designated sub-tertian. This naturally has vitiated many of the figures obtained prior to the use of this new technique, but it is hoped that for the future definite and reliable statistics will be available of the incidence of each parasite. The section has also compiled statistics of malaria morbidity since 1925, and associated the figures with meteorological observations as far as these are available.

The Entomological Section carried on the mosquito surveys which have been made in previous years, and in addition completed the paris green experiment which was commenced in 1929 at Kitale. Advantage was taken of the outbreak of plague in Nairobi to investigate fleas in relation to domestic rats and wild rodents and to plague. In the course of this investigation we obtained evidence that plague does occur amongst wild rodents. It is also interesting to record that this year gerbilles, which previously have only been found in one township in the country, have been discovered in other parts though, so far, no definite connexion between them and plague has been proved. Observations were also made on the breeding seasons of wild rodents and the town rat. In addition, cyanogas was experimented with for de-ratting native huts, with results sufficiently encouraging to warrant the hope that by further investigation and experiment it may be developed into the best means of controlling rat infestation in native reserves.

The Biochemical Section has carried on routine work as in previous years, and has prepared over 80,000 doses of metallic bisinuth suspended in glucose solution for use in the treatment of yaws and syphilis.

#### 6.—RESEARCH WORK.

##### (a) *Dysentery*.

This is an important disease in this Colony, although, clinically, it does not appear to be so severe as during the Great War. It is a frequent occurrence nowadays to have patients passing dysenteric stools for twenty-four hours and then recover completely, even without treatment. The investigations which have been made in the Bacteriological Section by the laboratory assistant, J. de Souza, indicate that many of these cases are probably due to anomalous organisms which do not conform to any which have been described previously, but the fact that they are agglutinated by the patients' sera and also appear in almost pure culture in many of the cases, suggests they exert a definite pathogenic action. Naturally, further investigation is necessary, and it will be some little time before all the essential cross-agglutination tests can be carried out.

##### (b) *Plague*.

The report of the Bacteriological Section contains information as to the work on plague vaccine which has been carried out during the year. Many interesting facts have been elicited. In the first place it is important to note that although inoculation of live plague culture into white rats may cause death, it is often impossible to find plague bacilli microscopically or even on culture. On the other hand, similar inoculation into certain field rodents gives typical spleen smears post-mortem. It is also interesting to note that the disability recorded in regard to white rats is not met with when the plague culture is given by intraperitoneal inoculation. Experiments were carried out during the year to test the relative value as regards the production of immunity of Bombay plague vaccine and Nairobi plague vaccine, and also the value of heated as compared with carbolized vaccine, the results indicating that carbolized vaccine is much superior in immunizing qualities to heated vaccine.

##### (c) *Pneumonia*.

This disease is probably responsible for the largest number of deaths amongst Africans in the Colony, and it was determined this year to commence investigation of the types of pneumococci which occur in cases, with a view to improving treatment by the use of anti-sera should the pneumococci belong to Types I or II. As will be seen, however, from the report of the Bacteriological Section, most of the pneumococci isolated fall into Group IV. In view of these results, investigation has been made of the possibility of treatment by an autogenous vaccine, and by intraperitoneal inoculation of white mice and the use of the peritoneal washings at the end of twenty-four hours as a vaccine after carbolization has given encouraging results. It is also intended to use a polyvalent vaccine of pneumococci isolated from local cases, to see whether it has any definite effect upon the course of the disease.

##### (d) *Malaria*.

Reference has already been made to the work which has been carried out on staining technique. In addition, Dr. Garnham has made observations on crescent production in sub-tertian infections, and the action of quinine upon

it. From the results he suggests that crescent production is a function of the parasite, and that the crescent wave can be prevented by the exhibition of quinine. Work has also been carried out upon the presence of immune bodies in the sera of convalescent malaria cases, but so far no results of any value can be recorded, though investigations along biochemical lines are encouraging. It has been suggested in a paper on malaria parasites, which was read before the Kenya branch of the British Medical Association in January, that there seem to be two varieties of sub-tertian parasites distinguishable in East Africa. Observations on this matter are still continuing, as it requires a considerable number of cases and a constant hourly record of the appearance of the parasites, to enable anything definite to be recorded.

(e) *Paris Green Experiment.*

An experiment to test the value of paris green as an anti-malaria measure, on the lines of the Porto Torres experiment, was commenced at Kitale in 1929, and concluded in July, 1930. The results obtained have shown that paris green, under the conditions which exist in Kitale, is an efficient substitute for oiling, and possesses the great advantage that the cost is considerably less. One difficulty met with was the absence of a suitable dust with which to mix the paris green in Kitale Township itself, and the only one in the district which has proved satisfactory has had to be brought from the Elgon caves, a considerable distance away. Investigations of other materials, such as lime, are in hand, and it may be possible to find a substitute which will prove cheaper than that at present in use for this purpose in Kitale. A suggestion has been put forward for the extension of this work to other stations, but this will naturally take time, and it would be uneconomical to replace apparatus already purchased for oiling before it is worn out.

(f) *Trypanosomiasis.*

This disease has caused considerable anxiety in one area in South Kavirondo during this year, and in February, Dr. McLean was detailed, on his return from leave, to carry out investigations in the area. Though administratively he was under the direction of the Medical Division, the general supervision of the scientific side of his work was under the Laboratory Division. The survey which was carried out necessitated first of all a determination of the most practicable method of diagnosing trypanosome infections without on the one hand consuming an inordinate amount of time, and on the other hand failing to detect all but an insignificant number of infected persons. It was eventually decided that the three most suitable methods were : (1) examination of material obtained by gland puncture, (2) examination of thick blood films, (3) cell counts of the cerebro-spinal fluid.

Once the best methods of examination had been determined, the whole of the locations in the supposedly infected areas of South Kavirondo were examined, the population in each place being called up and checked against the hut tax register. So thoroughly was the work done, that in most places the figures obtained by Dr. McLean exceeded those of the register. The procedure adopted was in the first place gland palpation, all those with enlarged glands being set on one side for examination by gland puncture and thick blood films. Of the rest, who showed no obvious glandular enlargement, those with symptoms suggestive of sleeping sickness were also picked out for further investigation by thick blood films, or by lumbar puncture. A register of all these persons suspected of sleeping sickness was made, and if any of them proved positive on investigation their names with full particulars were transferred to the card index. In this way it was ensured that all patients could be easily traced, and the results of treatment observed by any subsequent investigator. Doubt was felt at one time as to whether reliance could be placed upon an increased cell count in the cerebro-spinal fluid in a district where yaws and syphilis were endemic, and a Sigma reaction was carried out on a number of cases in which the cell count was high, to determine the possibility of the increase being due to disease other than trypanosomiasis. In the majority of cases the Sigma reaction was negative. Another possible cause of confusion was the occurrence in the reserve of a number of cases of post-encephalitis lethargica, but in all the cases of this disease who were examined by lumbar puncture, the cell count was not raised as it would have been had the patients been in the final stages of trypanosomiasis, which the clinical conditions appear to simulate. The disease in South Kavirondo appears to be mild.

although undoubtedly fresh cases are still occurring in the district due to the fact that the people visit fly-infested bush in order to obtain water from the streams. While this increase in persons infected is noted in the Kuja River zone, other areas where the disease formerly existed now show few, if any, cases, and those only in advanced stages of the disease. In the Kuja River area it is clear that any measures directed to the elimination of tsetse fly and control of the disease must be preceded by a policy of afforestation, in order to relieve the population of the necessity of visiting the streams to obtain supplies of firewood or for water. After this has been carried out, the clearing of a wide area of bush at watering places will assure the divorce of the people from contact with fly, but experience has taught us that unless such clearing is followed by agricultural development to maintain the cleared areas under grass or crops, the bush speedily grows again and the fly returns to its old haunts.

Towards the close of the year the Medical Officer in charge of Sleeping Sickness visited Central Kavirondo, but had not completed his survey by the close of the year; his investigations up to that time showed that one location, Kadimu, appeared to be a centre where the disease had spread since previous investigation by Dr. Enzer. In this location the greater part of the infected population inhabit a small peninsula heavily covered with bush. Here again measures required for the control of the disease are essentially centred in agricultural development and afforestation. Up to the present, no fly survey of this area has been made, but it seems probable that the whole peninsula is infested with tsetse, and that for its eradication a policy of bush-clearing, followed by the development of cultivated shambas or grazing lands is necessary to prevent the peninsula reverting to its present condition. Such development is not only necessary from the point of view of trypanosomiasis, but, owing to the shortage of food grazing in the near vicinity, is a development necessary for the economic welfare of the population.

- Dr. McLean's observations on treatment indicate that whereas Bayer 205 rapidly causes the destruction of trypanosomes in the peripheral blood, it has little, if any, effect upon the disease when the central nervous system is involved. On the other hand, tryparsamide leads to rapid improvement in the clinical symptoms, and reduction in the cell count in the cerebro-spinal fluid to normal or almost normal. Further investigations are being carried out as to the optimum dose of Bayer 205 and of tryparsamide for the treatment of cases, but at the close of the year the standard treatment adopted for adults consisted of three injections of 1 gram of Bayer 205 at weekly intervals, followed by three to six injections of 2 grams of tryparsamide, also at weekly intervals, both drugs being given intravenously.

Dr. McLean has observed that when trypanosomes could be demonstrated in the lymph glands, they could also invariably be demonstrated in the peripheral blood, using the thick drop method and staining with Giemsa, the drop being examined for three-quarters of an hour under a one-twelfth inch objective. He also notes that in several cases in the third stage of trypanosomiasis who showed glandular enlargement and had cerebro-spinal cell counts of over 1,000 cells per c.mm., numerous trypanosomes were found in the peripheral blood.

#### *(g) Typhus Fevers.*

Judging by the number of cases that have been reported to the Laboratory, there has been an increase this year in the incidence of these diseases. Unfortunately, we cannot record any further advances in diagnosis. Clinically, the majority of cases are readily recognizable, and two varieties may be distinguished, in one of which an initial lesion is seen, while in the other none can be recognized. Apart from this difference from the clinical point of view, both varieties run the same course, nor is one more virulent than the other. In one or two cases the initial lesion has been removed, but up to the close of the year no report has been made on the sections. Serologically, agglutination has been obtained in a few of the cases with certain of the indol-producing strains of *Proteus* "X 19" and "Warsaw." On the other hand, most of the cases have failed to agglutinate these cultures, even when tested on several occasions in the course of the disease. Following on the work which has been done in the Malay States, it is intended to make a survey of the mites which are found on domestic and wild rodents in the Colony.

The following articles have been published during 1930 by members of the Laboratory staff :—

S. P. James and W. H. Kauntze :

“ Malaria Parasites in Kenya and Uganda ” (*Kenya and East African Medical Journal*, March, 1930).

C. B. Symes :

“ Note on the Epidemicity of Plague ” (*Kenya and East African Medical Journal*, March, 1930).

C. B. Symes :

“ Anophelines in Kenya ” (*Kenya and East African Medical Journal*, April, 1930).

W. H. Kauntze :

“ Blood Changes in Malaria ” (*Kenya and East African Medical Journal*, May, 1930).

R. P. Cormack and N. P. Jewell :

“ Typhus Fevers ” (*Journal of Tropical Medicine and Hygiene*, October 15th, 1930).

#### B.—SEROLOGICAL SECTION.

##### 1.—STAFF.

The section was under the control of Dr. H. D. Tonking until October, when he departed on leave and was relieved by Captain R. P. Cormack, who remained in charge until the close of the year.

##### 2.—IMMUNITY TESTS FOR SYPHILIS AND YAWS.

Examinations of serum from cases of suspected syphilis and yaws were carried out on 2,934 specimens. During the earlier part of the year only the Sigma reaction was performed, but later on the Kahn test was used, with occasional cross checks by the Sigma reaction on the same sera, for the purpose of verifying the accuracy of the technique.

Sigma reactions on blood sera	...	...	...	...	1,753
Kahn reactions on blood sera	...	...	...	...	1,181
				Total	2,934

Owing to the complication of the Kahn technique with cerebro-spinal fluids, this test, although done in a few instances, was abandoned in favour of the Sigma reaction for the purpose of examining those fluids. In all, 77 were dealt with by the Sigma method.

The Kahn reaction has been found sensitive and exceedingly reliable. On account of its rapidity, cheapness, and simplicity, and the fact that animals can be dispensed with, preference has been given to it over all other tests so far used.

##### 3.—AGGLUTINATION REACTION.

Widal's reaction was done on 212 samples of serum. The results are as follows, taking as positive agglutination in a dilution of 1 in 50 or higher, and using a fairly monospecific set of emulsions, with Dreyer's technique :—

##### *African and Indian*—

Negative	...	...	...	...	122
B. typhosus alone	...	...	...	...	27
B. paratyphosus A. alone	...	...	...	...	1
B. paratyphosus B. alone	...	...	...	...	3
B. paratyphosus C. alone	...	...	...	...	1
Group T.A.B.C.	...	...	...	...	13
Br. melitensis	...	...	...	...	11

##### *European*—

Negative	...	...	...	...	21
B. typhosus alone	...	...	...	...	5
Others	...	...	...	...	0
Group T.A.B.C.	...	...	...	...	8
Br. melitensis	...	...	...	...	0

Total examined ... 212

The comparative rarity of infections with the paratyphoid organisms will be noted.

## C.—CALF LYMPH SECTION.

## 1.—STAFF.

There have been no changes in the staff during the year, except that the Senior Bacteriologist took over charge in October from the Assistant Bacteriologist, who went on leave.

## 2.—PRODUCTION OF CALF LYMPH.

The supply of calves has continued to be a difficulty, and the necessity of transporting the animals by lorry through infected areas has increased the cost of producing lymph. Hand feeding with lucerne hay has been necessary for the whole year. It is hoped that next year some arrangement for delivery at the Laboratory itself of healthy calves may be effected without the need for paying the cost of transport.

## 3.—QUALITY OF LYMPH.

The lymph has been of good quality, and the percentage of successful vaccinations has been satisfactory. In a country such as this, where smallpox is endemic, it is often difficult to assess the value of a lymph, on account of previous contact with the disease.

## 4.—PRODUCTION OF CALF LYMPH DURING 1930 (SUMMARY) :—

Total number of calves received	...	...	...	...	122
Total number of calves from which lymph collected	...	...	...	...	117
Total number of grammes of pulp collected	...	...	...	...	1,629
Average yield per calf (grammes)	...	...	...	...	13.92
Number of doses manufactured	...	...	...	...	488,700
Number of doses issued	...	...	...	...	515,442
Number of doses remaining on hand on 31st December, 1930	...	...	...	...	245,100
Cost of calf lymph production	...	...	...	...	£638-19-8
Cost per dose manufactured	...	...	...	...	0.313 pence

## 5.—SUPPLY OF CALF LYMPH TO STATIONS.

The following stations were supplied with the amounts shown opposite them :—

Mombasa	...	...	...	...	...	167,300
Nairobi	...	...	...	...	...	2,588
Kisumu	...	...	...	...	...	58,000
Kakamega	...	...	...	...	...	26,000
Kisii	...	...	...	...	...	72,800
Kapsabet	...	...	...	...	...	624
Kitui	...	...	...	...	...	2,340
Nakuru	...	...	...	...	...	5,200
Narok	...	...	...	...	...	6,830
Machakos	...	...	...	...	...	1,300
Malindi	...	...	...	...	...	1,200
Meru	...	...	...	...	...	1,800
Nyeri	...	...	...	...	...	260
Fort Hall	...	...	...	...	...	440
Voi	...	...	...	...	...	7,400
Eldoret	...	...	...	...	...	1,605
Kericho	...	...	...	...	...	600
Lamu	...	...	...	...	...	2,400
Mazeras	...	...	...	...	...	57,000
Kilifi	...	...	...	...	...	22,000
Samburu	...	...	...	...	...	8,000
Mariakani	...	...	...	...	...	19,000
Miscellaneous	...	...	...	...	...	40,755
						505,442

## 6.—VACCINATION RETURNS.

Returns have been received from the various stations (see page 15), showing the numbers vaccinated and the results.

BELGAUM STRAIN, 1930.

C. 240	C. 241	C. 247	C. 248	C. 256	C. 262	C. 263	C. 268	C. 269	C. 278	C. 284	C. 285	R. 1
C. 303	C. 305	C. 306	C. 317	C. 318	C. 322	C. 323	C. 328	C. 329	C. 340	C. 347	C. 348	C. 296
												C. 299
												C. 300
												C. 310

BOEDANG STRAIN, 1930.

C. 212	C. 228	C. 251	C. 252	C. 258	C. 259	C. 272	C. 289	C. 290	C. 292	C. 298	R. 4	
												C. 299
												C. 300
												C. 310
												C. 344

C. = Calf  
R. = Rabbit

PARIS STRAIN, 1930.

C. 212  
C. 229

C. 237	C. 253	C. 254	C. 273	C. 274	C. 275	C. 288	C. 291	R. 5
C. 297	C. 309	C. 311	C. 319	C. 320	C. 321	C. 330	C. 331	C. 294

SOUTH AFRICAN STRAIN, 1930.

C. 199

C. 234	C. 235	C. 236	C. 265	C. 266	C. 267	C. 279	C. 280	C. 282	C. 283	C. 293	C. 304	C. 305	C. 346
C. 242	C. 243	C. 244	C. 245	C. 246	C. 257	C. 264	C. 265	C. 266	C. 267	C. 279	C. 280	C. 282	C. 349

C. = Calf  
R. = Rabbit

ZANZIBAR STRAIN, 1930.

C. 233	C. 239	C. 249	C. 250	C. 255	C. 260	C. 261	C. 271	C. 276	C. 277	C. 236	C. 27	C. 270	R. 3
C. 301	C. 302	C. 307	C. 308	C. 315	C. 316	C. 324	C. 325	C. 326	C. 327	C. 327	C. 338	C. 339	C. 295
C. 202	C. 230	C. 231											

C. = Calf  
R. = Rabbit

VACCINATION RETURN, 1930.

E. 277

RESIDENCE	No. of Persons Vaccinated	SEX		PRIMARY VACCINATIONS			RE-VACCINATIONS			PREVIOUS VACCINAL CONDITION			Unknown	
		Male	Female	Total	Succ.	Fail.	Unknown	Total	Succ.	Fail.	Total	Succ.	Fail.	
Fldoret	1,629	1,199	450	1,569	982	68	519	60	37	6	..	..	..	..
Fort Hall	140	140	..	101	27	74	482	39	8	31	..	..	..	..
Kakamega	3,651	3,645	6	60	178	..	52	32	112	2,841	..	..	..	..
Kapsabet	165	168	..	107	6	..	..	3	..	..	..	..	..	..
Kericho	2	2	..	..	..	..	4,369	2,37	2	..	..	..	..	..
Kisii	59,694	50,692	2	4,30	1	..	..	..	..	2,837	..	..	..	..
Kisumu	15,659	15,644	17	52	24	5	23	451	182	71	198	13,036	1,244	14,340
Kirui	930	930	..	68	1	..	..	67	205	..	235	57	..	57
I amu	224	224	..	..	5	37	1	..	36	153	15	69	34	34
Machakos	234	273	..	11	87	1	..	86	196	..	196	1	..	1
Malindi	77	633	124	..	..	..	..	..	2	..	..	755	..	755
Meru	13	17	6	75	57	18	..	..	2	1	..	..	..	..
Mombasa	81,69	81,697	..	..	..	..	..	..	..	..	..	81,697	..	81,697
Dist. M.O.H.	158	101	54	..	..	..	..	..	158	17	..	141	..	..
Nakuru	432	432	9	179	74	..	..	105	253	182	..	..	..	..
Narok	1,70	1,07	89	1,693	12	2	1,684	4	..	..	..	..	..	..
Nyeri	194	13	1	23	22	1	..	171	115	56	..	..	..	..
Voi	78	70	8	62	..	62	..	16	..	..	115	..	..	..
Miscellaneous	1,93	1,093	80	1,828	3	9	1,816	115	..	..	..	..	..	..
GRAND TOTAL..	1,9445	167,027	2,413	11,574	1,493	183	9,901	7,658	590	359	6,709	95,640	1,244	6,884

#### D.—PATHOLOGICAL SECTION.

## 1.—HISTOLOGICAL EXAMINATIONS.

245 specimens were examined during the year. Of these, 42 were from Europeans, 143 from Africans, 56 from post-mortem examinations, and 4 from animals. The details are as follows :—

(i) EUROPEANS—							
(a) Tumours—	Benign	..	..	..	..	..	12
	Malignant	..	..	..	..	..	11
(b) Curettage —	Non-malignant	..	..	..	..	..	7
	Malignant	..	..	..	..	..	2
(c) Inflammatory lesions		..	..	..	..	..	10
	Total	..	..	..	..	..	42
(ii) AFRICANS—							
(a) Tumours, Benign—							
Adenoma	..	..	..	..	..	..	1
Cysts	..	..	..	..	..	..	11
Fibroma	..	..	..	..	..	..	17
Epulis	..	..	..	..	..	..	1
Lipoma	..	..	..	..	..	..	3
Osteoma	..	..	..	..	..	..	2
Polypus	..	..	..	..	..	..	1
Hæmangioma	..	..	..	..	..	..	1
Myeloma	..	..	..	..	..	..	1
Glioma	..	..	..	..	..	..	1
(b) Tumours, Malignant—							
Carcinoma	..	..	..	..	..	..	30
Chorion-epithelioma	..	..	..	..	..	..	1
Hypernephroma	..	..	..	..	..	..	1
Sarcoma	..	..	..	..	..	..	19
(c) Tuberculous lesions	..	..	..	..	..	..	11
(d) Other inflammations	..	..	..	..	..	..	42
	Total	..	..	..	..	..	143

## 2.—POST-MORTEM SPECIMENS FOR HISTOLOGICAL EXAMINATION.

(i) HUMAN TISSUES—						
(a) Tumours—Benign	..	..	..	..	..	2
Carcinoma	..	..	..	..	..	5
(b) Tuberculous specimens	..	..	..	..	..	7
(c) Lungs—Pneumonic	..	..	..	..	..	4
(d) Spleen—Congested	..	..	..	..	..	1
Malarial	..	..	..	..	..	4
Fibrotic	..	..	..	..	..	1
(e) Liver—Cirrhosis	..	..	..	..	..	3
Amyloid	..	..	..	..	..	1
Fatty	..	..	..	..	..	1
(f) Brain—Malarial	..	..	..	..	..	4
Inflammatory	..	..	..	..	..	2
(g) Intestines—Inflammatory	..	..	..	..	..	1
(h) Kidneys—Acute nephritis	..	..	..	..	..	1
(i) Inflammatory lesions other than above	..	..	..	..	..	11
(j) Hodgkins disease	..	..	..	..	..	2
(k) Normal tissues	..	..	..	..	..	6
Total	..	..	..	..	..	56

## 3.—POST-MORTEM EXAMINATIONS.

139 post-mortem examinations were carried out during the year. The causes of death were found to be as follows :—

Anthrax-- Septicæmia ..	..	..	..	..	..	1
Intestinal ..	..	..	..	..	..	1
					—	2
Cirrhosis of liver ..	..	..	..	..	..	1
Drowning ..	..	..	..	..	..	1
Dysentery - Bacillary ..	..	..	..	..	..	3
Gangrene of lung ..	..	..	..	..	..	1
Gastro-enteritis ..	..	..	..	..	..	1
Kidneys - Acute nephritis ..	..	..	..	..	..	1
Chronic interstitial nephritis ..	..	..	..	..	..	2
Pyonephrosis ..	..	..	..	..	..	1
					—	4
Malaria ..	..	..	..	..	..	5
,, Cerebral ..	..	..	..	..	..	2
					—	7
Myelogenous Leukæmia ..	..	..	..	..	..	1
Myocarditis ..	..	..	..	..	..	9
Pericarditis, other than pneumococcal ..	..	..	..	..	..	1
Peritonitis ..	..	..	..	..	..	2
Plague - Septicæmic and bubonic ..	..	..	..	..	..	17
Pneumonic ..	..	..	..	..	..	2
					—	19
Pleurisy ..	..	..	..	..	..	2
Pneumonia - Broncho ..	..	..	..	..	..	8
Lobar ..	..	..	..	..	..	20
Lobar and meningitis ..	..	..	..	..	..	8
Lobar and pericarditis ..	..	..	..	..	..	2
					—	30
Poisoning - Alcoholic ..	..	..	..	..	..	1
Septicæmia ..	..	..	..	..	..	4
Status lymphaticus ..	..	..	..	..	..	2
Trypanosomiasis ..	..	..	..	..	..	1
Typhoid ..	..	..	..	..	..	5
Tuberculosis Pulmonary ..	..	..	..	..	..	5
Generalized ..	..	..	..	..	..	6
Meningeal ..	..	..	..	..	..	3
					—	14
Tumours - Carcinoma of intestines ..	..	..	..	..	..	2
Carcinoma of liver ..	..	..	..	..	..	1
Glioma of brain ..	..	..	..	..	..	1
Hypernephroma ..	..	..	..	..	..	1
					—	5
Violence - Strangulation ..	..	..	..	..	..	1
Wounds ..	..	..	..	..	..	7
Rupture of intestines ..	..	..	..	..	..	1
Fracture of skull ..	..	..	..	..	..	6
					—	15
<b>TOTAL ..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>139</b>	

## E.—BACTERIOLOGICAL SECTION.

The work done by the section during the year will be dealt with under the following headings :—

1. Routine Examinations.
2. Manufacture of Vaccines for Public Use.
3. Preparation of Vaccines for Individual Patients.
4. Research Work.

This latter has been confined almost entirely to the subjects of enteric infections, pneumonia and plague. Here it may be said that the staff of the section consists of one medical officer, one European laboratory assistant, two Goan assistants and one trained African, and menial staff; and that, especially in view of the cramped and inconvenient accommodation obtained in the **present old Laboratory**, the territory entered upon for exploration by these workers is far too large.

The investigations attempted in the field of plague were really necessarily entailed by the routine of vaccine-making.

## 1.—ROUTINE EXAMINATIONS.

Number of specimens received for microscopical examination ...	1,142
Specimens received for cultural examination ... ... ...	978

## SUMMARY OF ROUTINE EXAMINATIONS.

- (a) *Actinomycosis*.—*Streptothriees* have not been met with in a single case.
- (b) *Anthrax*.—*B. anthracis* was found in five cases of pustule, and in one spleen post-mortem.
- (c) *Gonorrhoea*.—*Neisseria gonorrhoeæ* was found in 39 cases of male urethral exudate, and in three cases of vaginal discharge.
- (d) *Acute Meningitis*.—*Neisseria intracellularis* was found in nine specimens of cerebro-spinal fluid or of brain post-mortem; *Diplococcus pneumoniae* in seven cases. In one specimen of meninges and one of cerebro-spinal fluid, both pneumococci and meningococci were found, giving rise to doubt as to the primary infection.
- (e) *Pneumonia*.—A series of cases has been investigated with the object of a survey of the pneumococcal types at work in the district. Details are given under Heading 4.
- (f) *Undulant Fevers*.—In a case of this class in a European, repeated blood cultures yielded a very small cocco-bacillus of *Alcaligenes* (*Brucella*) type, which failed to respond to any standard serum. An organism similar in characters was met with from a similar case in Manchester in 1920. Viscidity of agar growth and haemophilic nature were marked features.
- (g) *Plague*.

*Human Cases*: *Pasteurella pestis* was obtained by blood culture in three cases, was found in one blood smear, and in 55 cases of gland puncture; also in one lung post-mortem, and in four specimens of sputum. No sufficient evidence is before us of the occurrence of a case of genuine pneumonic plague; merely of the involvement of the lungs in cases of septicemic type. Certain rather anomalous cases of mixed *P. pestis* and pneumococcal infections of the lung occurred, the pneumococci being of Group IV. These are thought to be terminal or intercurrent pneumonia in cases of plague modified by previous anti-plague vaccination; clinically, they were unsuspected of being plague until plague bacilli, together with pneumococci, appeared in mouse culture of sputum.

*Rats*: Out of 281 rats found dead in Nairobi and district, 162 were found to be obviously infected with plague—a proportion of 57.6 per cent. Two cats suspected of plague were examined, with negative results.

- (h) *Tuberculosis*.—96 specimens of sputum were found positive, practically all from African patients.
- (i) *Diphtheria*.—*Corynebaeterium diphtheriae* was found in eight throat swabs.
- (j) *Enteric Infections*.—*Eberthella typhi* was recovered in two cases by blood culture.

*Salmonella schottmulleri* (Paratyphosus B.) was recovered in one case from lung post-mortem by mouse culture, and from one sample of faeces.

*Dysentery*.—Types of the Flexner Group were recovered from faeces in six cases.

*Enteritis*.—*Salmonella aertrycke* was found in one specimen of faeces.

*Dysenteroid or Parenteric Infections*.—In 36 specimens of pathological stool, unclassified or unidentified types of non-lactose fermenting bacilli were found with circumstances suggesting these to be of pathogenic significance. Several of these organisms are of regular occurrence, and have been provisionally relegated to the *Shigella*, *Salmonella* groups, etc. Similar miscellaneous organisms have been reported on by other workers, e.g., by Harvey Pirie

from the Nairobi Laboratory during the War, and by Cormack from Uganda. Inquiries so far conducted into these unnamed intestinal bacteria collected during the year are dealt with under Heading D. Experience so far gained in Nairobi by the present workers seems to suggest that these miscellaneous types are associated, perhaps causatively, with sporadic infections, while bacillary dysentery of epidemic nature is attributable to the Flexner Group exclusively. In no cases have types identifiable with those of Shiga or Sonne been found. *Salmonella morgani* and two or three other classified types have occurred occasionally, though not with any very clear suggestion of pathogenicity in the cases affected.

(k) *Conjunctivitis*.—*N. gonorrhoeæ* was found in two cases; morphological pneumococcus, not verified by culture and bile test, in four cases; *Hemophilus conjunctivitidis* (Koch-Weeks) in seven cases; and *H. lacunatus* (Morax-Axenfeld) in six cases.

(l) *Leprosy*.—*Mycobacterium lepræ* was identified in nine specimens of nasal exudate.

Two cases of rat leprosy have been found in the course of examination of many hundreds of trapped rats for plague; one case in a *R. rattus*, one in a species of field rat.

(m) *Hemophilus influenzae*.—This has been found in a number of cases of lobar pneumonia, associated with pneumococcus, usually of Group IV, but occasionally as an apparently pure causative infection.

(n) *Typhus*.—Weil-Felix tests to the number of 19 have been done in cases which were clinically Tropical Typhus. In only four cases were the tests positive, and these invariably with the indol-producing strains of *Proteus* "X 19" and "Warsaw."

(o) *Water Analyses*.—37 samples of water have been analysed and reported upon, largely by aid of the Laboratory Assistant stationed at Mombasa for the regular analysis of the water supply of that town.

(p) *Sisal Factory Effluent*.—Samples of this odiferous fluid have been experimented with in the hope of obtaining a hint as to the best means of dealing with it to prevent nuisance. It was found that decomposition proceeded fairly satisfactorily in samples which were kept well aerated at room temperature, while samples kept under anaerobic conditions—that is, in a deep receptacle undisturbed—for the same length of time, remained apparently unchanged. A marked spontaneous reduction of hydrogen ion concentration occurs, and of the types of bacteria found to be present, one is a small aerobic cocco-bacillus of marked proteolytic powers, which may perhaps be of importance. Anaerobic fermentation appears not to occur. These findings are supported by the satisfactory experience of a certain sisal factory, which has made a practice of allowing its decorticator effluent to fall from a height into open runnels.

## 2.—VACCINE MANUFACTURE.

(a) *T.A.B. Prophylactic*.—14,000 doses have been prepared in the year, and 2,000 doses issued to the Colony.

*Method of Preparation*.—This is roughly in imitation of Haffkine's method for plague vaccine. Cultures are incubated in flasks of 10 per cent "P 3" (auto-digest of bullock's pancreas) for three weeks at 37° C. Smooth cultures are used which exhibit the "O" type of agglutination. An attempt is made to employ recently collected virulent cultures, but this has only been successful with the typhoid element.

The culture is sterilized for use as vaccine by means of phenol in the cold. The product bears a close physical resemblance to Haffkine plague prophylactic, and the adopted human dose of 1.0 c.c. gives rise to considerable local and general symptoms. That it has a quite definite protective action has been shown by immunity tests performed with rabbits by Besredka's method. In regard to the importance now attached, perhaps not altogether rationally, to the "O" element in T.A.B. vaccine, it has been found that injections of 1.0 c.c. subcutaneously of this largely autolysed broth culture vaccine in humans produce agglutination titres from 1/25 to 1/250 for typhosus "O"

suspension (obtained from the Enteric Laboratory, Kasauli), and of 1/500 to 1/1,250 for Oxford Standards "H" suspension. But whether in this case the actual immunizing antigen is heat-resistant or "O" antigen, or heat-labile, as the immunizing antigen in the Nairobi Haffkine plague vaccine has been found to be (*see under Plague Vaccine*), is as yet unknown. It is not impossible that this broth culture form of T.A.B. may be superior in protective power to the standard agar-grown type, in like manner as Haffkine prophylactic is undeniably much superior to the agar-grown forms of plague vaccine.

(b) *Anti-Plague Prophylactic*.—410,000 doses have been made during the year, and 163,820 doses issued to the Colony. 75,000 doses have been lost through accidental contamination from dusty and otherwise unfavourable conditions for such work which are inseparable from the still-occupied old Laboratory.

*Method of Preparation*.—This was modified somewhat towards the end of 1929. A batch of vaccine is formed by 9 two-litre conical flasks, each containing 1.125 litre of special broth at pH = 7.0, bearing a film of olive oil; or of 8 two-litre globular flasks containing each 1.250 litre, the number of each form of flask being decided by incubator capacity. Cultures are inoculated with standard culture of originally mixed strains of *P. pestis*, obtained from plague rat and fatal human cases, maintained at a constant high pitch of virulence by continuous passage through rats; cultures for vaccine are incubated in electric incubators at a constant temperature of 30° C. for six weeks, each flask being shaken every fourth day. Atmospheric temperature at Nairobi is too variable for cultivation at room temperature as is done in the cooler season at the Haffkine Institute, Bombay. Sterilization is effected in the cold by addition of 10 c.c. of pure phenol to each flask.

*Standardization*.—For constancy of quality, reliance is placed upon strict uniformity in process of manufacture, supported by estimations by opacity method of bacillary substance in suspension, and by regularly repeated induced immunity tests with white rats inoculated with vaccine averaged by equal mixing of several brews. It is impracticable to carry out such tests with each batch prepared separately.

Each batch of vaccine is stored in a 10-litre aspirating bottle at room temperature, for five weeks before issue. It would be preferable to store it in the cold, if sufficient cold-storage space were available. Vaccine is bottled directly from these aspirating vessels into rubber-capped 8-ounce medicine bottles, to simplify issue and use in large quantities, also into 25-c.c. vaccine bottles for issue in small quantities. All vaccine not issued within three months is discarded.

*Rat Passage of Plague Vaccine Culture*.—Inoculation by the subcutaneous route of white cage-rats gave rise to much embarrassment because, although the animals generally succumbed in their due time, it was often impossible to recover the plague bacilli from them; usually no bacilli could be recognized microscopically in their organs, and the chain of passage was liable thus to frequent breakages. Recourse was therefore had for a while to the common field rodents, *Rattus coucha* and *Arvicanthus*; the first-named very susceptible species invariably died rapidly, and always with vast numbers of bacilli in the spleen. But subsequently it was found that by intra-peritoneal inoculation of the far more conveniently dealt with white rat, supplies of which are always maintained, death was usual in twenty-four hours or so, plague bacilli were nearly always numerous in the spleen and peritoneal exudate, and very rapid passage could thus be effected without difficulty in recovering culture for vaccine purposes. All plague cultures are grown at 30° C.

*Plague Vaccine Induced Immunity Tests*.—The adopted rat dose is 0.3 c.c. of vaccine subcutaneously, that for human use being set at 2.0 c.c. The test dose of plague virus is given fourteen days later, in the form of subcutaneous injection of a suspension in dilute broth of young agar culture. The strength of the test dose, estimated by the opacity of the method, is controlled as nearly as possible to bring about the death of all non-vaccinated control rats between the third to the fifth day; a markedly over-lethal dose is an unfair strain upon the protective power of the vaccine to be tested. It is thought, however, that the lethality of a given dose of plague bacilli depends far more

upon their degree of virulence than upon their numbers, considering the great penetrative powers possessed by these organisms. Averaged in Table I appear all the results of tests performed with six-weeks incubated vaccine made with passaged culture of high virulence. In the table, Rats A are vaccinated, Rats B the non-vaccinated controls. Great care is taken to select animals of uniform size in each group, and to inoculate and generally treat them in a uniform manner.

TABLE I.

Rats	Vaccine Dose	Vaccine Deaths	Plague Deaths	Survival	
				Per cent	Per cent
A.48 ..	0.3 c.c.	Nil	16.6	83.4	
B.48 ..	Nil	..	97.9	2.1	

TABLE II.

Representing a test done with full-grown rats vaccinated with 2 minimis (0.118 c.c.) :—

Rats	Vaccine Dose	Vaccine Deaths	Plague Deaths	Survival	
				Per cent	Per cent
A.12 ..	0.118 c.c.	Nil	74.9	25.1	
B.12 ..	Nil	..	100.0	Nil	

TABLE III.

By arrangement with Dr. B. P. B. Naidu, Plague Research Officer to the Haffkine Institute, samples of Bombay vaccine and Nairobi vaccine were exchanged with a view to comparative tests of immunization susceptibility of the brown Madras rats used in Bombay and the white rats used in Nairobi. The table exhibits two tests of the Bombay Haffkine vaccine, done with dose of 0.3 c.c., followed by virus inoculation fourteen days after, and with dose 0.5 c.c. with test dose seven days later, as by the Haffkine Institute procedure—which is designed to test toxicity of vaccine samples as well as immunizing potency.

Rats	Vaccine Dose	Vaccine Deaths	Plague Deaths	Survival	
				Per cent	Per cent
A.12 ..	0.3 c.c.	Nil	63.6	36.4	
B.12 ..	0.5 c.c.	8.3%	63.6	36.4	
C.12 ..	Nil	..	100.0	Nil	

*Note.*—These are not fair representative tests of the Haffkine Institute vaccine because, owing to exceptional pressure upon the Plague Vaccine Department, the vaccine above used had to be incubated in culture for only three weeks instead of the most favourable and standard period of six weeks.

The next table shows a test with twice the normal dose of Nairobi vaccine in full-grown rats.

TABLE IV.

Rats	Vaccine Dose	Vaccine Deaths	Plague Deaths	Survival	
				Per cent	Per cent
A.12 ..	0.6 c.c.	16.6	10	90	
B.12 ..	Nil	..	100.0	Nil	

The result, compared with that of the Bombay vaccine test with 0.5 c.c. in Table III, suggests a similar toxicity for the Nairobi product, and the dose of 0.3 c.c. to be about the most satisfactory for rats. It is thought that rats and humans that suffer severely from the toxins of killed plague culture or vaccine are those which are likely to derive no protection from vaccine, and to succumb to the toxin of plague infection.

*Tests of Heated compared with Unheated Nairobi Vaccine.*

TABLE V.

Rats A received 0.3 c.c. of carbolized vaccine heated in a water-bath for one hour at 100° C. Rats B received the same dose of the same vaccine not heated. Rats C are non-vaccinated controls. Rats D received 0.3 c.c. of another sample of vaccine, not carbolized but sterilized by heat in the water-bath at 55° C. for one hour. Rats E received the same dose of the same vaccine unheated but sterilized in the cold by the usual amount added of phenol. Rats F are non-vaccinated controls.

Rats	Vaccine Dose	Vaccine Deaths	Plague Deaths	Survival
A.12 ..	0.3 c.c. (100° C.)	Nil	Per cent 83	Per cent 16
B.12 ..	0.3 c.c.	Nil	16.6	83.4
C.12 ..	Nil	..	95.8	4.2
D.12 ..	0.3 c.c. (55° C.)	Nil	33.3	66.7
E.12 ..	0.3 c.c.	Nil	8.3	91.7
F.12 ..	Nil	..	100.0	Nil

The above results suggest that the immunizing antigen in Haffkine plague vaccine is adversely affected by heat, and that the critical temperature is close on 100° C. In the first experiment the phenol present may have played a part in destroying antigen when heated. It remains to repeat tests with heated uncarbolized vaccine.

*Human Inoculation.*—The 2.0 c.c. dose appears to be effective, as far as can be judged from reports of the results of native inoculation, more or less unreliable as they always must be. It is feared that a higher dose would, by its toxicity, have discouraging effects. As it is, it has been reported from one important plague-affected area that natives have now such confidence in the vaccine as to apply in large numbers for inoculation.

*Field Rats : Comparative Susceptibility Tests.*—These have been done in a sporadic and incomplete manner—time, space and circumstance having interfered with inoculation of any considerable number of wild rodents on any one occasion. Only the three commonest species have been tested, viz. *Rattus coucha* (Multimammate mouse), *Otomys* sp., and *Arvicantus*. The procedure has been to inoculate subcutaneously two or three individuals at a time on repeated occasions with similar dosage of standard rat-passaged culture of constant virulence, using white rats, whose degree of susceptibility is well known, as controls on the test dose and as a standard of comparison. Susceptibility is judged by the length of time taken to bring about death. The white rats used are comparable to domestic rats in that maximum mortality occurs on the fourth day after inoculation.

TABLE VI.

SPECIES	Number Used	Rate of Death	Average Rate of Death
<i>R. coucha</i> .. ..	21	Days 1 to 4	Days 2.3
<i>Otomys</i> .. ..	3	2 to 3	2.6
<i>Arvicantus</i> .. ..	13	3 to 7	5.0
White rats .. ..	Routine use	3 to 5	4.0
<i>R. rattus</i> .. ..	1	3	Probably 4

The number of *Otomys* tested is very small, but they were specimens of very similar size. Great trouble was experienced with the extraordinarily agile and fierce black rats, the Kenya domestic species; two of them escaped after inoculation, so that it was judged inadvisable to attempt any more in the old Laboratory.

On autopsy, *Rattus coucha* invariably showed vast numbers of plague bacilli of notably vigorous appearance, in the spleen, kidney, liver and suprarenal; *Arvicathus* and *Otomys* a few only, and white rats, subcutaneously inoculated, usually none that could be recognized as bacteria.

*Note on Colony Form in Virulent Plague Culture.*—The agar colony in virulent rat-passaged culture is very uniform in type, viz., dome-shaped, sometimes with a central knob, and a marked tendency to form a fringe with rather irregular margin. This type of colony has been beautifully photographed by Burgess on the West Coast. The surface is not smooth or glossy as in the case typically of members of the typhoid-colon group, but delicately shagreened. The smoothest colony of *P. pestis* would be probably called rough in the case of a *Salmonella* culture. Viscidity of agar culture does not seem to be of any particular constancy or significance.

*Anti-Plague Therapeutic Serum.*—A quantity of his new type of therapeutic plague serum was kindly sent to the Laboratory by Dr. B. P. B. Naidu on request, and was issued to the Nairobi Infectious Diseases Hospital for trial on plague cases by Drs. Connolly and Robertson. Results with a small series of cases were sufficiently encouraging to indicate continued use.

*High Titre Plague Agglutinating Serum.*—This has been made from time to time by repeated massive subcutaneous inoculations of rabbits with live attenuated culture. It is used for testing cultures which are regularly collected from plague rats, etc., with a view to discovery of the existence of any other member of the *Pasteurella* group simulating plague, such as the *Pasteurella* organism recently reported by Harvey Pirie from South Africa. Such serum also provides a more certain and rapid means than fermentation reactions of verifying cultures of doubtful appearance that occasionally occur.

(c) *Anti-rabie Vaccine.*—The passage of fixed virus obtained from the Haffkine Institute in 1929 has been continuously maintained, and a sufficient quantity of carbolized vaccine has been prepared every two months to meet any possible demands for Pasteur Treatment. No cases were received for anti-rabic treatment during the year.

(d) *Other Vaccines.*—Sufficient stocks of polyvalent staphylococcal, streptococcal (designed for the common streptococcal ulcerating pustules popularly but erroneously called "veld sores"), anti-catarrhal, acne, and gonococcal vaccines have been prepared.

### 3.—PREPARATION OF VACCINES FOR INDIVIDUAL PERSONS.

(a) *Autogenous Vaccines.*—132 vaccines of autogenous nature, including the special "agglutinating coliform" vaccines for rheumatism and also for parenteric conditions, have been made; and 36 patients have received courses of vaccine treatment in the Laboratory.

### 4.—RESEARCH WORK.

(a) *Plague.*—That attempted on plague has been touched on in the section dealing with plague vaccine.

(b) *Pneumonia.*—With the help of Dr. Vint, who provided post-mortem material, and of Dr. Garnham, who supplied clinical material, a series of cases of pneumonia, almost exclusively among African patients, has been investigated bacteriologically. Table VII summarizes the work done, the pneumococci therein being all verified by bile test, and derived mainly from lobar pneumonic sputum; there are included a few strains recovered from cerebro-spinal fluids or meningeal exudate post-mortem, or by blood culture and lung puncture.

TABLE VII

Number of Cases	Type I.	Type II.	Type III.	Group IV.
140	9·3%	3·6%	6·4%	80·7%

In addition to the above, thirteen cases of lobar pneumonia yielded by mouse culture only bile insoluble diplo-streptococci morphologically and culturally more or less closely resembling pneumococcus, some of which fermented inulin. In two further cases of lobar pneumonia, dealt with post-mortem, the lung of one was cavitated with incipient gangrene, and by inoculation of a young rat yielded *B. paratyphosus B.*; the other by mouse culture yielded *B. pneumoniae* of Friedlander.

*Technique.*—All cases, excepting culture from blood and cerebro-spinal fluid, were dealt with by intraperitoneal inoculation of mice, sometimes of young white rats which respond equally well, of saline emulsion of sputum, lung, etc. Typing and bile tests were done usually with peritoneal washings, centrifugalized rapidly to remove pus cells; sometimes with peptone beef broth subculture from blood agar culture of the mouse's heart blood.

For bile solubility tests, sodium desoxycholate 1 per cent in normal saline is used, in proportion of 4 drops in 20 for peritoneal washings and 1 drop in 20 for broth culture, in Dreyer's agglutination tubes, with control tubes for comparison, containing the same number of drops of saline to replace the bile salt solution. Results with pure broth culture are always complete clarification, while, with peritoneal washings, results are always strongly definite, though perfect clarification is never obtained.

Agglutination tests for typing are done with peritoneal washings or sometimes broth culture, formalinized by the addition of one or two drops of 10 per cent formalin to 5 c.c. of suspension. Tests are put up with serum obtained from Parke, Davis and Co., in Dreyer's agglutination tubes, and incubated at 56° C. in the water-bath. For diagnosis of Type III, reliance has been placed on recognition of the characteristic colony.

The proportion of Group IV infections obtained is exceptionally high. Emulsions of sputum are made thoroughly by stirring with pressure with a stout glass rod in a narrow test tube. The mice inoculated intra-peritoneally in the afternoon were invariably found dead or moribund the following morning when typings were done. Even if occasionally chance Group IV pneumococci not pathogenic in the case were picked up by the procedure used, they were by the invariable lethal results of mouse inoculation of a sufficiently high virulence to be potentially causative of pneumonia, and therefore legitimately included in the table of prevalence of types. The chances that mice inoculated with sputum will pick up rapidly fatal infection from pneumococci accidentally collected by sputum during its passage to the exterior, rather than those brought up in the sputum from the affected lung, seem small.

Two cases, however, in which Type I was obtained by blood culture and Group IV by mouse culture of sputum from the same cases, suggest, in the light shed by Griffiths' work on transmutation of types, that denaturing of Type I had here occurred by action of the patients' anti-bodies; and that typing by sputum culture, or even by the often unproductive method of lung puncture, may not be a reliable means of ascertaining the actual type infection for purposes of serum treatment.

#### F.—SECTION OF MEDICAL BIOLOGY.

##### 1.—STAFF.

This section remained under the care of Dr. H. D. Tonkin till October, when he went on leave. Captain R. P. Cormack relieved him. Various laboratory assistants did duty from time to time, according to the need for posting to various places.

The African personnel remained to some extent the same throughout the year.

##### 2.—BLOOD EXAMINATIONS.

Slides examined for malarial parasites	...	...	4,544
P. falciparum present alone	...	...	783
P. vivax present alone	...	...	77
P. malariæ present alone	...	...	58
Mixed infections	...	...	35
Parasites present but not differentiated	...	...	8

## Other parasites—

Unsheathed microfilaræ	...	...	...	...	14
S. rossi	...	...	...	...	8
Total blood counts	...	...	...	...	11
Differential white counts	...	...	...	...	1,066
Arneth counts	...	...	...	...	8
Blood grouping	...	...	...	...	12
Miscellaneous	...	...	...	...	6

The percentage of positive examinations for malaria parasites is much higher this year than last, yet there does not seem to be anything striking in the reported incidence of the disease.

## 3.—FÆCES EXAMINATIONS.

1,743 specimens of stools were examined for helminths or protozoa. Of these, 1,007 showed neither, and 736 showed infection with one or other, or both.

Of those infected, 164 showed infection with a single protozoon, and 296 with a single helminth. There were 276 infections with more than one organism, ranging up to one case showing ova of four different helminths along with the different protozoa.

The numbers of times the various organisms were encountered are as follows :—

Chilomastix mesnili	...	...	..	...	3
Endolimax nana	...	...	...	...	27
Iodamœba butschlii	...	...	...	...	55
Giardia intestinalis	...	...	...	...	18
Entamœba coli	...	...	...	...	200
Entamœba histolytica	...	...	...	...	34
Trichomonas hominis	...	...	...	...	3
Embadomonas intestinalis	...	...	...	...	3
Unidentified flagellates	...	...	...	...	53
Ankylostoma duodenale	...	...	...	...	136
Ascaris lumbricoides	...	...	...	...	95
Taeniae	...	...	...	...	154
Hymenolepis	...	...	...	...	8
Strongyloides stercoralis	...	...	...	...	29
Trichuris trichiura	...	...	...	...	141
Schistosoma mansoni	...	...	...	...	35
Enterobius vermicularis	...	...	...	...	21
Unidentified ova	...	...	...	...	1

The number of histolytica infections has risen considerably this year.

## G.—MALARIA SECTION.

## 1.—STAFF.

The section was under the direct control of the Deputy Director of Laboratory Services until May 15th, 1930, when Dr. Garnham, who was seconded temporarily from the Sanitation Division of the Medical Department, took charge.

## 2.—RESEARCH WORK.

(a) *Compilation of Statistics.*

(1) Graphic representations were made of the number of malaria cases—obtained from the monthly returns on Form (a)/(b)—occurring in most places in the Colony, from 1925 onwards. Although, as statistics, such data are unreliable and open to many fallacies, they provide the only available information on what is perhaps the most important aspect of the subject, viz. morbidity, and by taking into consideration the factors responsible for the inaccuracy of the figures, it is possible to obtain an idea as to the fluctuations and outbursts of the disease.

(2) They are accompanied by meteorological curves, plotted from information supplied by the Agricultural Department, and later by the Statistical Department.

(3) In a few areas it has been possible to supplement the above by curves representing anopheline density.

(b) *Examination of Blood Slides.*

NUMBER OF NEGATIVE SLIDES	..	..	..	9,554
NUMBER OF POSITIVE SLIDES—				
<i>P. falciparum</i> (total) ..	..	..	..	3,557
,, gametocytes ..	..	..	..	178
<i>P. malariae</i> (total) ..	..	..	..	769
,, gametocytes ..	..	..	..	68
<i>P. vivax</i> (total) ..	..	..	..	149
,, gametocytes ..	..	..	..	17
Positive ? species ..	..	..	..	372

Blood slides were obtained monthly from Kitale, Taveta and Kisii dispensaries. Slides were fairly regularly sent in from Machakos, Mombasa, Digo, Limuru, Malindi, and, towards the end of the year, from the Masai Province. The Kitale slides were from the same people each month. In order to extend the area under observation to include places where blackwater fever was more rife, a visit was made in October, in the company of the Deputy Director of Laboratory Services, to Kitale, and monthly examination of the labour employed on three suitable farms was arranged. We are indebted to Dr. Dru Drury, Farm Medical Officer, for taking the Kitale slides each month.

Sub-tertian malaria was the prevailing type in the Colony throughout the year; in a very few districts, e.g. certain locations (Kikuinbuliu) in the Machakos Reserve, quartan malaria appeared to be equally common. No area was absolutely free from quartan, slides from all districts showing it in small numbers, but in no place and at no season, with the exception noted above, did it approximate in numbers to the sub-tertian type of the disease. *Plasmodium vivax* was encountered fairly often in slides from Machakos, and from certain coastal districts, but very rarely elsewhere.

*Variations in the Rates.*—It was thought to be unwise to draw any deductions from the monthly results of the Kitale slides, as, in this preliminary year, too many extraneous factors influenced the fluctuation in the parasite rate, factors which, at the end of the year, had been eliminated, and which, it is hoped, will have no effect upon our figures in the future. Three fallacies were particularly obvious, namely, the results of different observers; the results obtained by a new method of staining (q.v.); and the reversal of the order of examination of thick and thin films, for when the latter are examined first, the thick drop (on the same slide) is apt to be damaged during the first process of staining, and the percentage of positives is lowered thereby. A true picture, however, is probably shown by the variations occurring in the different age groups. In Kitale, the 0 to 5 years and the 6 to 15 years curves closely approximate (at a fairly lower level, *circa* 40 per cent), whilst the adult curve represents an incidence roughly one-third that of the children. This rather unusual incidence of infection is probably due to two causes, namely, a mild endemicity, which prevents the occurrence of immunity in the older children, and secondly, the partial immunity of adults, which has been developed during their previous residence elsewhere.

Continued and current observations on the above lines should provide the necessary data by which epidemics (particularly general ones) may be forecasted, namely, the epidemic factor (from the morbidity curves), the fluctuations in immunity (as measured by blood infections, and/or possibly spleen rates), the relative humidity, and, what will have to be added, the economic factor (food prices) (Gill : *Genesis of Epidemics*).

### 3.—RESEARCH.

We were fortunate in obtaining the use of a medical ward in the Native Hospital for the particular study of malarial cases, without which advantage most, if not all, of the work described below would have been impossible.

(a) *Staining Technique.*—Experiments were performed with a view to obtaining a method by which the differentiation of species of the malarial parasite could be made with certainty on every occasion, as the ordinary methods could not be relied upon to give constant results. Silicate treatment of blood-slides was found to be the necessary preliminary, and a modification of Gordon's Stain, suggested by Dr. Kauntze, showed up the essential characters of the sub-tertian markings in the red cells. Details of this method will be published early in 1931 in the *Kenya and East African Medical Journal*.

(b) *Crescent Production in Sub-tertian Infections.*—Observations were continued on the mode of gametocyte production in sub-tertian malaria, work which, earlier in the year and in 1929, had been performed at the Native Hospital, Nairobi, and which is embodied in the paper which will also be published in the *Kenya and East African Medical Journal* early in 1931. This later work demonstrated an equally high crescent rate in untreated cases of the disease, and it confirmed two of the main theories, viz : (1) the inhibitory effect of the *early* administration of quinine on the development of the gametocyte, and (2) the sexual sterility of recrudescences following untreated (i.e. non-quininized) primary attacks of sub-tertian malaria. There is a normal production of crescents in recrudescences following treated cases, whilst relapses (untreated) always exhibit the gametocyte phase. The theory of the foreign protein nature of crescents, and the transitory appearance of an antibody in response which sterilizes recrudescences, is thereby strengthened. It should be particularly stressed that quinine is only effective in *preventing* the crescent phase ; it has no direct destructive action, as is confirmed by Green in Malaya, though it is to be noted that the latter worker was only examining cases of more than five days' duration, or cases in which the crescent flood had already been established, and that therefore the inhibitory effect of quinine in the early stages was not appreciated.

(c) *Immunity.*—The almost complete failure to demonstrate the presence of anti-bodies in the serum of convalescent malarial subjects suggested that work should be undertaken in this direction, and it was carried out in two ways—one direct, the other indirect. The first was on the effect of supposedly immune sera on cultures of the corresponding type of malarial parasite, and the second was the chemical changes occurring in the blood throughout the disease. The latter estimations have been made by the Biochemist, and the work on both lines is still unfinished. Work has been commenced on the estimation of iron in serum (probably representing malarial pigment rather than a haemoglobinæmia)—an apparently untouched line of research—and the preliminary results are most promising. The investigation will be extended to include Henry's melano-flocculation tests, etc.

(d) *Sub-species of P. falciparum.*—Examination of numerous slides of sub-tertian malaria revealed the fact that a minute proportion only conformed to the appearance supposed to be characteristic of this infection; in fact, many of them had been diagnosed in the past as quartan, so large and pigmented were the rings. The new method of staining, however, demonstrated the true species. Observations have been made and are being continued from the following angles to determine the validity of the sub-species : hourly blood-slides, cultures, spleen punctures, characters of the crescent blood, ex-flagellation of the micro-gametocyte, cycle in the mosquito and sub-inoculation experiments.

#### H.—SECTION OF MEDICAL ENTOMOLOGY.

##### 1.—ORGANIZATION AND STAFF.

Mr. J. I. Roberts was appointed to fill the vacancy created by the transfer of Mr. Hopkins to Uganda last year. He commenced duty on 12th February, 1930.

Small fluctuations have occurred in the numbers of the African staff, but with the institution of contract agreements we may now hope to retain well-trained assistants.

##### 2.—MOSQUITOES AND MALARIA.

Investigations or collections have been carried out in the following places : Mombasa, Teita Hills, Taveta, Limuru-Nairobi Road, Voi, Kisii, Kitale and Trans Nzoia, Mombasa and district, Lamu, Malindi, Kilifi, Kaniadoto (South Kavirondo), Kakamega, Kisumu, Kericho, Fort Hall, Nanyuki, Nyeri, Kiambu, Ruiru, and Thika.

In most places investigated, work by the field squad is followed by a report and map of breeding-places. This method affords no excuse for local authorities to assume ignorance of anopheline breeding conditions : its use appears to be appreciated.

(a) *Nairobi and District.*—Routine catches of larvae and adults have been made up to September, when some disorganization upset the continuance of the work. This is the fifth year of a fairly close watch on anopheline activity in the capital. The results are made available to the Medical Officer of Health

for his control measures, and are being correlated with the fuller meteorological records that we are now able to obtain, in an attempt to get a picture of anopheline behaviour as it affects malaria incidence over a cycle of years.

(b) Several surveys have been carried out in Mombasa and on the mainland, at the request of the Medical Officer of Health. The adult catchers remained at duty there until November.

(c) Trained mosquito boys were stationed at Kisii, Kakamega and Kisumu for continuous duty. Their work has formed the basis of the anti-malaria work in these districts.

(d) The special surveys in Kitale and the Trans Nzoia ceased in March, but certain areas of the district were included in the itinerary of the Malaria Overseer, Uasin Gishu. Separate reports on the work in this area have been submitted.

The paris green experiment in Kitale Township was terminated in July. Sufficient evidence has been accumulated to warrant the adoption of the method by the local sanitation staff. A separate report is being submitted on this work.

We wish to record here the excellent work done in this district by the two field assistants, Messrs. J. O. Harper and J. Nimmo.

(e) A new assistant was trained for survey work in the Uasin Gishu area, and the work was terminated on December 31st, and a separate report is being prepared.

(f) At Taveta, the trained boys were joined by Mr. Harper in July. The work was intensified somewhat, and blood-slides were taken at regular intervals. It is hoped that a report on this district may be submitted soon.

(g) From time to time surveys have been made at Limuru, Nyeri, Kericho, Fort Hall, Nanyuki, Ruiru, and Thika, in connexion with control measures proposed by medical officers in charge.

During the year, *A. costalis* has been found at Nyeri in small numbers. The observation of its influence on malaria should be valuable.

(h) Investigations were started in the coast districts of Malindi, Kilifi, and Lamu. Here the problem of malaria control is essentially connected with domestic water supplies. Nearly every house has its tank, in which anophelines, particularly *A. funestus*, breed in large numbers.

The year's additions to anophelines which are already known are :—

*A. garnhami*, Edw., from Kericho, Nairobi and the Uasin Gishu area;

*A. multicinctus*, Edw., from Taveta and the Trans Nzoia,

and two varieties of *A. marshalli* near to *A. marshalli* varieties *pitchfordi* and *frectownensis*.

### 3.—FLEAS, RATS AND PLAGUE.

Rat and flea studies have been continued in Nairobi, Mombasa and Kisii during the year. Additional catches have been made at Fort Hall, Maseno, Taveta and Bura.

The gerbille, *Tatera vicina*, which had previously been recorded only from Machakos, has been found quite widely distributed in Kenya.

Numbers of smears from the spleens of field rats taken in the Fort Hall district were examined, and one each from *Lemniscomys striatus*, *Arvicanthus abyssinicus*, and *Rattus coucha* appeared to show plague. Specimens of *Xenopsylla brasiliensis*, taken from *Rattus rattus* trapped in the K.A.R. Lines, were used in preliminary experiments for the transmission of plague to *R. coucha*. The results have yet to be confirmed, however. There is every indication that this species of flea can, and does, transmit plague readily under certain conditions.

From our records over a period of one year, it would appear that our common field rats, *Arvicanthus abyssinicus*, *Otomys angoniensis* and *Rattus coucha*, show a period of high reproduction during the months January to May, with the peak usually from March to May. There appears to be another short season of prolific production during October and November. *R. rattus*, in towns, exhibits perhaps less definite breeding periods; the records so far obtained suggest a peak period during January to April, with a lesser one in

October and November. The output of *R. rattus* fluctuates so much over a period of one year that it is difficult to associate high production with any particular season.

In June Sir Edward Thornton passed through on his way to Uganda to advise on the plague problem there. All our records, both published and unpublished, were made available for him and parts of his report are based on our preliminary work.

Since his visit we have made small experiments in the use of Cyanogas for de-ratting native huts. It would seem that, with a small trained staff, the method could be developed and adopted successfully in native reserves.

#### 4.—TSETSE AND SLEEPING SICKNESS.

No work was done during the year.

#### 5.—GENERAL.

(a) *Meteorology*.—Further small observation stations were established at Malindi, Msambweni, Voi, Taveta and Nyeri. It is hoped to arrange that the records be submitted direct to the Director, B.E.A. Meteorological Service, for his use, and from him we may be able to obtain data in the form most suitable to ourselves.

(b) Propaganda work has been continued at health shows held in Nairobi, Mombasa, Lamu, Giriama, and Nyeri.

(c) Showcases of arthropods of medical and veterinary importance have been set up and handed to the Deputy Director of Sanitary Service for distribution.

(d) Some small amount of work has been done in collaboration with the Veterinary Research Officers on an investigation of the carriers of a sheep disease.

We wish to record our appreciation of the help given us during the year by the Director and staff of the Imperial Institute of Entomology, by Mr. F. W. Edwards of the British Museum, and by Miss Evans of the Liverpool Tropical School.

### I.—BIOCHEMICAL SECTION.

The organization in this section remained the same during the year.

#### 1.—ROUTINE WORK.

The following table gives the nature and number of the biochemical examinations made during the year. An increase over the number of the previous year has again to be noted.

##### (a) Urines.

General examination, i.e. reaction, specific gravity, sugar, albumin and microscopic examination of deposit	...	...	...	...	...	...	790
Albumin and sugar (quantitative and qualitative esti- mations)	...	...	...	...	...	...	80
Blood	...	...	...	...	...	...	6
Microscopic examination only	...	...	...	...	...	...	3
Bence-Jones protein	...	...	...	...	...	...	2
Urea concentration test	...	...	...	...	...	...	3

##### (b) Faeces.

Occult blood	...	...	...	...	...	...	9
Fat content	...	...	...	...	...	...	2

##### (c) Blood.

Sugar tolerance curves	...	...	...	...	...	...	16
Urea	...	...	...	...	...	...	3
Non-protein nitrogen	...	...	...	...	...	...	2
Van den Bergh reaction	...	...	...	...	...	...	1
Lævulose hepatic efficiency test	...	...	...	...	...	...	1

##### (d) Miscellaneous.

Fractional test meals	...	...	...	...	...	...	17
Cerebro-spinal fluids : Lange test and protein estima- tions	...	...	...	...	...	...	11
Human milk samples	...	...	...	...	...	...	4

Total number of examinations ... 950

(e) The preparation of metallic bismuth for the treatment of yaws and syphilis was continued, and during the year 85,901 doses of 2 c.c. were sent to the Medical Storekeeper for issue to medical officers.

## 2.—RESEARCH WORK.

Since 1926, a considerable amount of information has been collected from metabolic experiments on the amounts of calcium and phosphorus which are retained by the African native when he is given a diet deficient in calcium. The possibility of the inter-relationships of these elements extending to include nitrogen was suggested in the Report for 1929, and with the object of following out the nitrogen retention an experiment was carried out at Nairobi Prison. The results of this experiment will be incorporated in a communication to a technical journal, but thanks must be expressed here to the authorities at Nairobi Prison for their assistance in connexion with this work.

With the co-operation of the officer in charge of the Bacteriological Section, work was started on the distribution of nitrogen in sterile broth and in the plague vaccine prepared from it. The results of a few preliminary estimations would appear to warrant the continuation of the work, and it is hoped that this will be possible in 1931.

In conjunction with the officer in charge of the Malaria Section, a small number of estimations has been carried out on the protein content of sera from cases of malaria. These will be extended before the publication of results.

## J.—REPORT OF THE GOVERNMENT ANALYST FOR 1930.

The staff of the Government Analyst's Laboratory consisted of the Government Analyst and one unskilled native attendant.

It is regretted that the output of work of this laboratory is of necessity small, because it is not adapted to work on scientific or economical lines. With lack of staff and insufficient laboratory accommodation and equipment, it has been possible to undertake routine examinations only, and important investigational work and the numerous problems awaiting solution by chemical means have had to remain untouched. It is hoped that the new accommodation now in course of construction will enable some of this work to be attempted.

A considerable amount of the Analyst's work is of a consultative nature, and much time has been occupied in this way. In addition, the following samples have been examined :—

- (1) *Toxicological and forensic chemical examinations*, mainly for Police and Medical Departments : 101 samples, including viscera, poisoned arrows, fire exhibits, questioned documents, and witch-doctors' *dawa*.
- (2) *Water*, mainly for Public Works and Railway Departments : 45 samples, including examinations for domestic and industrial purposes, and pollution from factory wastes.
- (3) *Spirituous Liquors*, mainly for Municipality, Nairobi : 11 samples, including native *tembo*.
- (4) *Milk*, mainly for Nairobi Municipality in control of public health : 106 samples.
- (5) *Milk*, condensed and dried : 3 samples.
- (6) *Minerals and Assays*, mainly for Public Works Department and Office of Mines : 34 samples, including lime, limestone, sand, ores for precious minerals.
- (7) *Foods*, mainly for Municipalities and Tender Board : 31 samples, including tinned foods, maize, maize-meal, flour and bread.
- (8) *Drugs*, for Customs and Police and Medical Departments : 10 samples. including opium, anaesthetics, plant extracts.
- (9) *Oils, Fats and Waxes* : 2 samples.
- (10) *Miscellaneous* : 18 samples, including disinfectants, fire extinguishers, dutiable and prohibited imports, soap.

## APPENDIX I.

### ANNUAL REPORT OF THE CLINICAL LABORATORY OF THE NATIVE HOSPITAL, NAIROBI, 1930.

#### 1.—STAFF.

During the year, the personnel consisted of one European Laboratory Assistant, one or two native Laboratory Assistants, with the addition of one European learner for four months. The whole was under the general supervision of the officer in charge of the Pathological Section, as that section was housed in a neighbouring room for nine months of the year, while the rest of the laboratory was still in the old buildings in the town.

#### 2.—ROUTINE EXAMINATIONS.

The number of specimens shows the large increase in volume of work done this year.

An analysis and summary of the examinations made is as follows :—

##### (a) *Fæces.*

Total specimens of fæces examined	...	...	4,367
Single helminth infections	...	...	1,657
Multiple helminth infections	...	...	1,015
Total showing any helminths	...	...	2,672
Single protozoon infections	...	...	613
Multiple protozoon infections	...	...	10
Total showing any protozoa	...	...	623

The numbers of times the various organisms noted were met with are as follows :—

Taenia	...	...	...	in 1,270 specimens
Ascaris lumbricoides	...	...	„	577 „
Ankylostoma duodenali	...	...	„	1,090 „
Trichuris trichiura	...	...	„	742 „
Strongyloides stercoralis	...	...	„	88 „
Schistosoma mansoni	...	...	„	127 „
Enterobius vermicularis	...	...	„	14 „
Hymenolepis nana	...	...	„	4 „
Entamœba coli	...	...	„	584 „
Entamœba histolytica	...	...	„	2 „
Iodamœba butschlii	...	...	„	16 „
Flagellates, only noted	...	...	„	30 „

In considering these results it is always necessary to bear in mind the conditions under which the examinations were made. The primary object is to ascertain the presence or absence of the ova or cysts of certain known pathogenic organisms, helminths or protozoa, and in the search for those it is customary to note down what is encountered. This, then, need not be an exhaustive examination, particularly when one or more known pathogens have already been met. Consequently the results reflect fairly closely the incidence of the pathogenic inhabitants of the gut, but much less so that of the non-pathogenic.

##### (b) *Blood.*

###### For Parasites—

Negative	...	...	...	...	4,376
P. falciparum (including 48 crescents)	...	...	...	...	494
P. vivax	...	...	...	...	25
P. malariae	...	...	...	...	23
Mixed infections	...	...	...	...	14
S. rossi	...	...	...	...	4
Trypanosomes	..	...	...	...	5
Microfilariae, sheathed	...	...	...	...	1
Microfilariae, unsheathed	...	...	...	...	30
			Total	...	4,972

###### Blood Counts—

Complete total counts	...	...	...	19
Total leucocyte counts	...	...	...	21
Differential counts of white cells	...	...	...	52
		Total	...	92

Grand total of blood examinations ... 5,064

## (c) Urines.

General examinations	...	...	...	...	237
For parasites ( <i>S. haematochium</i> )—					
Negative	...	...	...	...	10
Positive	...	...	...	...	3

## For Gonococci—

Negative	...	...	...	...	3
Positive	...	...	...	...	2

## (d) Pus.

...	...	...	...	...	46
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## (e) Sputa.

## For T.B.—

Negative	...	...	...	...	292
Positive	...	...	...	...	23

For *B. pestis*—

Negative	...	...	...	...	118
Positive	...	...	...	...	1

## (f) Miscellaneous Examinations.

Lung punctures for *B. pestis*—

Positive	...	...	...	...	nil.
Negative	...	...	...	...	32

Gland punctures for *B. pestis*—

Positive	...	...	...	...	9
Negative	...	...	...	...	nil.

Spleen punctures for *B. pestis*—

Negative	...	...	...	...	2
Positive	...	...	...	...	nil.

## Fluids, etc.—

## Cerebro-spinal fluid for organisms, etc.—

Negative	...	...	...	...	23
Pneumococci	...	...	...	...	5
Meningococci	...	...	...	...	3
Gram negative bacilli	...	...	...	...	1

## Pleural fluids—

Negative	...	...	...	...	nil.
Pneumococci	...	...	...	...	1

## From knee joint—

Negative	...	...	...	...	2
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## Sources unknown—

Negative	...	...	...	...	3
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## Prostatic fluid for gonococci—

Positive	...	...	...	...	1
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Nasal smears for *B. lepræ*—

Negative	...	...	...	...	6
Positive	...	...	...	...	1

## Eye smears for organisms—

Negative	...	...	...	...	5
Positive	...	...	...	...	nil.

Total ... 829

*Totals*—

Faeces ... ... ... ... ... 4,367

Bloods ... ... ... ... ... 5,064

Uries, sputa, pus and miscellaneous ... 829

10,260

## APPENDIX II.

**RÉSUMÉ OF WORK CARRIED OUT AT THE CLINICAL LABORATORY  
ATTACHED TO THE NATIVE HOSPITAL, MOMBASA,  
DURING THE YEAR 1930.**

During the year 1930, a total number of 15,304 specimens was received and dealt with in the Laboratory, an increase of 381 over the previous year.

Of these, 5,202 were examinations of blood, 3,891 were examinations of faeces, 4,716 smears from rats were examined for the presence of plague, while the remaining 1,694 specimens were divided up between serological and bacteriological examinations, particulars of which are given in the following detailed account.

The following is a detailed summary of the work carried out during the year :—

(a) *Blood (Human)* : 5,202 examinations.

Differential leucocyte count only	...	...	218
Complete blood counts	...	...	17
Negative specimens	...	...	4,039
P. falciparum	...	...	778
P. malariæ	...	...	72
P. vivax	...	...	30
S. rossi	...	...	5
Trypanosomes	..	...	4
Sheathed microfilariae	...	...	3
Unsheathed microfilariae	...	...	36
Total	... 5,202		

(b) *Faeces* : 3,891 examinations.

The following table shows the number of occasions in which each individual helminth and protozoon appeared in the total faecal examinations made during the year :—

Negative specimens	...	...	...	964
Taenia saginata	...	...	...	692
Ascaris lumbricoides	...	...	...	951
Ankylostoma duodenale	...	...	...	1,431
Trichuris trichiura	...	...	...	1,344
Strongyloides stercoralis	...	...	...	142
Schistosoma mansoni	...	...	...	102
Oxyuris vermicularis	...	...	...	8
Hymenolepis nana	...	...	...	2
Entamoeba coli	...	...	...	481
Iodamoeba butschlii	...	...	...	4
Flagellates (undifferentiated)	...	...	...	14
Giardia intestinalis	...	...	...	39
Entamoeba histolytica	...	...	...	21
Entamoeba nana	...	...	...	15

*Specimens containing—*

1 Helminth	...	...	...	1,064
2 Helminths	...	...	...	916
3 Helminths	...	...	...	356
4 Helminths	...	...	...	191
2 Protozoa	...	...	...	10
1 Helminth and 1 protozoon	...	...	...	193
2 Helminths and 1 protozoon	...	...	...	105
3 Helminths and 1 protozoon	...	...	...	34
4 Helminths and 1 protozoon	...	...	...	7
1 Helminth and 2 protozoa	...	...	...	6
3 Helminths and 2 protozoa	...	...	...	1
Negative specimens	...	...	...	964

(c) *Serological Examinations* : 137.

137 agglutination tests were performed during the year against *B. typhosus*, *B. paratyphosus A.*, and *B. paratyphosus B.* The following were the results obtained :—

*Single culture agglutinated*—

<i>B. typhosus</i>	...	...	...	...	...	33
<i>B. paratyphosus A.</i>	...	...	...	...	...	1
<i>B. paratyphosus B.</i>	...	...	...	...	...	4
					Total ...	38

*Two cultures agglutinated*—

<i>B. typhosus and B. paratyphosus A.</i>	...	...	...	...	...	4
<i>B. typhosus and B. paratyphosus B.</i>	...	...	...	...	...	2
					Total ...	6

*Three cultures agglutinated*—

<i>B. typhosus, B. paratyphosus A., and B. paratyphosus B.</i>	...	...	...	...	...	4
					Total ...	4
<i>Positive sera</i>	...	...	...	...	...	48
<i>Negative sera</i>	...	...	...	...	...	89
					Total ...	137

(d) *Bacteriological Examinations*.

Thirty-one specimens requiring examination were received. These were dealt with and forwarded to Nairobi when further investigation or vaccine preparation was called for.

(e) *Specimens Received Requiring Microscopical Examination*.

*Gonorrhoea*.—64 specimens of urethral exudate were examined, and *Neisseria gonorrhoeae* was identified microscopically in 18.

*Leprosy*.—Nasal scrapings were sent from 24 lepers in the Infectious Diseases Hospital, and 18 showed the presence of *M. lepræ*.

*Cerebro-spinal Fluid Examinations*.—Four specimens were received for examination, and *N. meningitidis* was identified in each case.

*Sputa*.—427 specimens of sputa were received and examined, 128 of which showed the presence of tubercle bacilli.

*Miscellaneous Smears*.—70 smears from various sources were examined microscopically.

*Plague (Rodents)*.—4,716 smears from rats, either trapped or found dead, were examined for the presence of *P. pestis*, all of which proved to be negative.

(f) *Urines*.

732 specimens were received and examined as follows :—

<i>General examination</i>	...	...	...	...	719	
<i>Sugar content</i>	...	...	...	...	8	
<i>Albumin content</i>	...	...	...	...	4	
<i>Urea content</i>	...	...	...	...	1	
					Total ...	732

*Schistosoma hæmotobium* was encountered on 57 occasions in the course of the above examinations.

*P. pestis* was isolated from a urine in one instance. This specimen was forwarded to Nairobi for confirmation.

(g) *Fractional Test Meals.*

Five of the above tests were carried out.

(h) *Water Analysis.*

Eighteen bacteriological examinations of water were performed—twelve of the Mombasa Water Supply (a monthly examination), and six from various wells. The preliminary results of these were forwarded to Nairobi, with sub-cultures, where further cultural tests were carried out.

(i) *Sera for Sigma Reaction.*

168 specimens of sera were forwarded to Nairobi for the Sigma test.

(j) *Pathological Specimens.*

Six specimens were forwarded to Nairobi for examination.

(k) *Post-mortems.*

Five post-mortems were performed.

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